# NAVAL WAR COLLEGE REVIEW

**Summer 2011**
Volume 64, Number 3

# Report Documentation Page

*Form Approved*
*OMB No. 0704-0188*



| 1. REPORT DATE | 2. REPORT TYPE | 3. DATES COVERED |
|---|---|---|
| **2011** | | **00-00-2011 to 00-00-2011** |

| 4. TITLE AND SUBTITLE | 5a. CONTRACT NUMBER |
|---|---|
| **Naval War College Review,Summer 2011,Volume 64, Number 3** | 5b. GRANT NUMBER |
| | 5c. PROGRAM ELEMENT NUMBER |
| 6. AUTHOR(S) | 5d. PROJECT NUMBER |
| | 5e. TASK NUMBER |
| | 5f. WORK UNIT NUMBER |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Naval War College,,Newport,,RI, 02841** | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) |

12. DISTRIBUTION/AVAILABILITY STATEMENT
**Approved for public release; distribution unlimited**

13. SUPPLEMENTARY NOTES

14. ABSTRACT

**On 2 March 2011, the Type 054A Jiangkai II-class guidedmissile frigate Xuzhou arrived off the coast of Libya after transiting the Suez Canal to oversee the evacuation of the thousands of Chinese civilians working in that country's oil industry. This was evidently the first time a Chinese warship had ever entered the Mediterranean. There is thus a particular timeliness to our lead article,Daniel J. Kostecka's "From the Sea: PLA Doctrine and the Employment of Sea-Based Airpower." Through an analysis of doctrinal and academic writings on this subject the author explores current Chinese thinking concerning the production and employment of aircraft carriers and large-deck amphibious vessels of several types for the projection of power far from China's own shores.**

15. SUBJECT TERMS

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT **unclassified** | b. ABSTRACT **unclassified** | c. THIS PAGE **unclassified** | **Same as Report (SAR)** | **162** | |

**Cover**

*The Claiborne Pell Bridge across the East Passage of Narragansett Bay, as seen from the Naval War College's Pringle Hall on a June morning in 2010, its lower structure and the bay's surface, 215 feet below the roadway at its highest point, obscured in fog—which on that day (as is not always the case on the bay) dispersed quickly. The bridge, built in 1968–69 to link the Rhode Island cities of Newport in the east (to the left in the photograph) and Jamestown, is the longest suspension bridge in New England, at 11,247 feet overall. It was named for Senator Claiborne Pell (1918–2009) of Rhode Island in 1992.*

*Photograph by Joseph Quinn, Jr., of the Naval War College's Visual Communications Department.*

**Title Page (opposite)**

*Rear Admiral John N. Christenson (right) relieves Rear Admiral James P. Wisecup (left) as President of the Naval War College in a change of command ceremony held in Spruance Auditorium on 30 March 2011. The Chief of Naval Operations, Admiral Gary Roughead, is in the center. Rear Admiral Wisecup left Newport to assume, in Washington, D.C., on 18 April, duties as Naval Inspector General, in the grade of vice admiral.*

*U.S. Navy photograph by MCC (AW/NAC) Robert Inverso, USN.*

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NAVAL WAR COLLEGE PRESS
686 Cushing Road
Newport, RI 02841-1207

*Naval War College Review*
Code 32, Naval War College
686 Cushing Rd., Newport, RI 02841-1207
Fax: 401.841.1071
DSN exchange, all lines: 841
Website: www.usnwc.edu/press
http://twitter.com/NavalWarCollege

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The *Naval War College Review* was established in 1948 as a forum for discussion of public policy matters of interest to the maritime services. The thoughts and opinions expressed in this publication are those of the authors and are not necessarily those of the U.S. government, the U.S. Navy Department, or the Naval War College.

The journal is published quarterly. Distribution is limited generally to commands and activities of the U.S. Navy, Marine Corps, and Coast Guard; regular and reserve officers of U.S. services; foreign officers and civilians having a present or previous affiliation with the Naval War College; selected U.S. government officials and agencies; and selected U.S. and international libraries, research centers, publications, and educational institutions.

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Periodicals postage paid at Newport, R.I. POSTMASTERS, send address changes to: *Naval War College Review,* Code 32S, Naval War College, 686 Cushing Rd., Newport, R.I. 02841-1207.

ISSN 0028-1484

# CONTENTS

# FROM THE EDITORS

On 2 March 2011, the Type 054A Jiangkai II–class guided missile frigate *Xuzhou* arrived off the coast of Libya after transiting the Suez Canal to oversee the evacuation of the thousands of Chinese civilians working in that country's oil industry. This was evidently the first time a Chinese warship had ever entered the Mediterranean. There is thus a particular timeliness to our lead article, Daniel J. Kostecka's "From the Sea: PLA Doctrine and the Employment of Sea-Based Airpower." Through an analysis of doctrinal and academic writings on this subject, the author explores current Chinese thinking concerning the production and employment of aircraft carriers and large-deck amphibious vessels of several types for the projection of power far from China's own shores. He argues that the increasingly firm Chinese commitment to procuring such capabilities has little to do with any Taiwan-related scenario but reflects primarily China's determination to protect what it now insists is its "core" national interest in the South China Sea and, to a lesser but nevertheless significant extent, its desire to develop options for asserting a Chinese naval presence in distant seas for a range of contingencies such as counterpiracy, humanitarian assistance and disaster relief, and the protection of Chinese citizens abroad.

The acquisition of aircraft carriers has long been a matter of controversy for not only the Chinese but the Japanese as well. In "A New Carrier Race? Strategy, Force Planning, and JS *Hyuga,*" Vice Admiral Yoji Koda, Japan Maritime Self-Defense Force (JMSDF) (Ret.), surveys the prehistory of efforts by the JMSDF to develop carrier-like through-deck destroyers for antisubmarine warfare (ASW)—a politically sensitive issue for Japan and its neighbors, given memories of the offensive role of the Japanese carrier fleet in World War II. The author describes in detail the interplay of operational, strategic, and political factors that contributed to the development and procurement of Japan's first through-deck helicopter ASW destroyer, JS *Hyuga,* commissioned in March 2009. He argues that this new class of warship should be understood as a logical evolution of long-standing Japanese thinking about the vital ASW mission rather than as a radical new departure. Vice Admiral Koda was commander in chief of the Japan Maritime Self-Defense Fleet prior to his retirement in 2008. His most recent contribution to this journal was "The Emerging Republic of Korea Navy: A Japanese Perspective" (Spring 2010).

Next, Lieutenant Alaina M. Chambers, USN, and Steve A. Yetiv, in "The Great Green Fleet: The U.S. Navy and Fossil-Fuel Alternatives," review the ambitious steps the U.S. Navy is in the process of taking, under the leadership of Secretary of the Navy Ray Mabus, to reduce the dependence of the sea services on traditional fossil fuels. The current unrest throughout the Middle East and North Africa and the rising price of oil globally only underline the importance of this initiative.

The Navy continues to pay close attention to the regime of international maritime law and regulations, particularly in the context of the continuing disputes between China and its neighbors over territorial claims in the South China Sea. Andrew J. Norris, in "The 'Other' Law of the Sea," provides a detailed overview of the lesser-known international maritime conventions that supplement and support the framework provided by the United Nations Convention on the Law of the Sea (UNCLOS). Commander Norris, USCG, is on the faculty of the International Law Department at the Naval War College.

This year marks the one-hundredth anniversary of the birth of U.S. naval aviation. Robert F. Dunn, in "Six Amazing Years: RAGs, NATOPS, and More," looks back to the early years of jet aircraft in the Navy and traces the organizational innovations the service introduced in order to standardize pilot training in this new and challenging type of airplane as well as to reduce the extraordinarily high accident rate that plagued the carrier jet force at this time—a subject also explored by Robert C. Rubel ("The U.S. Navy's Transition to Jets") in the Spring 2010 issue of the *Review.* Vice Admiral Dunn, USN (Ret.), is a former Deputy Chief of Naval Operations for Air Warfare.

War gaming is a perennial topic for the *Review,* given the place of honor this discipline holds at the Naval War College's Center for Naval Warfare Studies. In their "Why Wargaming Works," veteran war-game designers Peter P. Perla and ED McGrady make an intriguing argument for the value of at least certain kinds of serious gaming, using insights derived from an unorthodox array of sources, from literary theory to cognitive science. They locate this value in war gaming's ability to construct a "narrative" that can have a "transforming" effect on an individual's relationship with real-life experience.

Finally, George H. Quester, in his essay "The Last Time We Were at 'Global Zero,'" in our Commentary department, explores the prospect—apparently embraced by the Obama administration—of a world without nuclear weapons, by way of comparison with a world on the brink of the nuclear era in the late 1930s and early 1940s. The result is a fascinating thought experiment that helps us weigh the merits of this once unthinkable transformation of the global strategic environment.

## IF YOU VISIT US

Our editorial offices are now located in Sims Hall, in the Naval War College Coasters Harbor Island complex, on the third floor, west wing (rooms W334, 334, 309). For building-security reasons, it would be necessary to meet you at the main entrance and escort you to our suite—give us a call ahead of time (841-2236) or use the phone at the main Sims Hall entrance (1-2236).


*Rear Admiral James "Phil" Wisecup became the fifty-second President of the U.S. Naval War College on 6 November 2008. He most recently served as Commander, Carrier Strike Group 7 (*Ronald Reagan *Strike Group), returning from deployment in October 2008.*

*A 1977 graduate of the U.S. Naval Academy, Rear Admiral Wisecup earned his master's degree in international relations from the University of Southern California, graduated from the Naval War College in 1998, and also earned a degree from the University of Strasbourg, France, as an Olmsted Scholar, in 1982.*

*At sea, he served as executive officer of USS* Valley Forge *(CG 50) during Operation DESERT STORM. As Commanding Officer, USS* Callaghan *(DDG 994), he was awarded the Vice Admiral James Stockdale Award for Inspirational Leadership. He served as Commander, Destroyer Squadron 21 during Operation ENDURING FREEDOM after 9/11.*

*Ashore, he was assigned to NATO Headquarters in Brussels, Belgium; served as Force Planner and Ship Scheduler for Commander, U.S. Naval Surface Forces, Pacific; and served as action officer for Navy Headquarters Plans/Policy Staff. He served as a fellow on the Chief of Naval Operations Strategic Studies Group; as Director, White House Situation Room; and as Commander, U.S. Naval Forces Korea.*

*Rear Admiral Wisecup's awards include the Defense Superior Service Medal, Legion of Merit, Bronze Star, and various unit, service, and campaign awards.*

## PRESIDENT'S FORUM

*This is the last President's Forum I will have the privilege of writing.*

IN MY PREVIOUS COLUMNS IN THIS JOURNAL I have made clear my view that the need for this school has never been greater. That has not changed; if anything, it has increased in this time of significant budget pressure. The earthquake and tsunami in Japan and the upheaval throughout North Africa and the Middle East tell us that the rapid pace of change in the world has not and will not subside in the near term, making what we are doing in Newport all the more important. I really believe this. Chester Nimitz, in a lecture here in 1960, stated that the war plans he inherited at the beginning of World War II had indicated an intention to shutter the Naval War College.* He, on the contrary, felt that it needed to be expanded, since he would need to increase the size of the officer corps fifteen times—which is what he proceeded to do.

During a recent meeting, as we looked at the day's "press pull," we noticed that the Naval War College had some connection with each of the top stories, either through research we had in progress, gaming we were doing, or books and articles that faculty or, in some cases, students were publishing. In this edition of the *Naval War College Review* we look at People's Liberation Army doctrine, carriers in world navies, the U.S. Navy and alternative energy, the history of naval aviation, the law of the sea, and war gaming.

Here are some simple highlights of accomplishments I've been privileged to witness—most of them involving significant support from the Naval War College Foundation:

- Receipt of funds to endow the first of six regional-studies chairs, the John A. van Beuren Chair of Asia-Pacific Studies, and selection of Professor Toshi Yoshihara as its first chair holder

* Fleet Adm. Chester W. Nimitz, "An Address" (lecture, Naval War College, Newport, R.I., 10 October 1960), CD-ROM in MP3 format, recording VR 2290, Naval War College Library.

- Refurbishment of the historic Mahan Reading Room
- Technological upgrade and major renovation of Spruance Auditorium
- Development of a major maritime history prize (for a major contribution to the advancement of the study of maritime history)—the Hattendorf Prize, awarded to Dr. N. A. M. Rodger, All Souls College, Oxford; the inaugural prize and check is to be awarded in the fall, later this year
- Deployment of faculty to Afghanistan to help U.S. Marine Corps generals in their analysis of operations
- Establishment of a Board of Advisors, with leading citizens and academics.

With the Foundation's help, the Evening Lecture Series has seen some very interesting speakers, such as Lewis Simon, George Will, Robert Kaplan, Sylvia Earle, and Dr. Robert Ballard.* The Naval War College has certainly felt the impact of the Foundation's first-ever year of million-dollar support. The edge that the Foundation provides has never been sharper.

All in all, the Naval War College has certainly benefited from the support not only from the Naval War College Foundation and Navy leadership but also from the staff and faculty of the College. You all have my lasting thanks.

This is the last President's Forum I will have the privilege of writing. It will be prepared for press just as I leave the Naval War College; by the time you read it, I will be in Washington, D.C. I will sorely miss the fine friends and stimulating experiences I have gained at the Naval War College. I look forward to a continuing association with the College and with all of you.

JAMES P. WISECUP
*Rear Admiral, U.S. Navy*
*President, Naval War College*

* George Will's evening lecture is available on the College's website, at www.usnwc.edu/Events/Evening-Lectures/Evening-Lecture---George-Will---The-Political-Argume.aspx. A C-SPAN2 video of Robert Kaplan's lecture is available at www.booktv.org/Watch/12050/Monsoon+The+Indian+Ocean+and+the+Future+of+American+Power.aspx.

*Mr. Kostecka is a senior analyst for the U.S. Navy. In addition to working for the Navy, Mr. Kostecka has worked for the Department of Defense and the Government Accountability Office; he was an active-duty Air Force officer for ten years and still serves in the Air Force Reserve, with the rank of lieutenant colonel. Mr. Kostecka has a master of liberal arts in military and diplomatic history from Harvard University, a master of arts in national security policy from the Patterson School of Diplomacy and International Commerce at the University of Kentucky, and a master of science in strategic intelligence from the National Defense Intelligence College. Mr. Kostecka is also a graduate of Squadron Officer School and the Air Command and Staff College and is currently a student in the Air War College distance learning program.*

*Naval War College Review, Summer 2011, Vol. 64, No. 3*

# FROM THE SEA

## PLA Doctrine and the Employment of Sea-Based Airpower

*Daniel J. Kostecka*

> *Aircraft carriers symbolize a country's overall strength. They are also the core of the navy's combined-arms sea operations. Building carriers has all along been a matter of concern for the Chinese people. To modernize our national defense and build a perfect weaponry and equipment system, we have to consider the development of carriers.*
>
> ADMIRAL LIU HUAQING, *MEMOIRS OF LIU HUAQING* (AUGUST 2004)

Despite an impressive naval modernization over the past two decades, the People's Liberation Army Navy (PLAN) currently possesses little in the way of force-projection capabilities.[1] The development of force projection through the acquisition of such platforms as aircraft carriers and amphibious assault ships is essential if PLAN forces, as they modernize and mature, are to engage in the full spectrum of traditional and nontraditional operations needed to protect Chinese interests, regionally and abroad. At this point, the most visible manifestations of the PLAN's desire to possess this type of force-projection capability are its Type 071 amphibious transport dock (LPD), commissioned in November 2007; a second Type 071 hull now under construction; and, most significant, the ongoing refurbishment of an incomplete, Soviet-built, *Kuznetsov*-class aircraft carrier at Dalian. These ships represent core elements of the PLAN's future force-projection requirements. Along with follow-on platforms, they will provide the capability to employ sea-based airpower and conduct expeditionary operations beyond the range of older and less capable amphibious vessels, as well as that of land-based air cover.

However, China's desire to possess modern force-projection capabilities for its navy is also the source of considerable speculation and misunderstanding. This is particularly true for China's aircraft carrier program. Speculation runs from forward-leaning predictions that by the early 2020s China could have as many as five aircraft carriers, including two nuclear-powered hulls, to a recent prediction from an Australian policy research think tank that despite evidence to the

contrary the Chinese are not serious about building aircraft carriers, because it would be "dumb for them to do so."[2]

China's LPD program has not generated anything like the controversy accompanying the aircraft carrier. However, it has received a significant amount of attention, if for no other reason than the type represents a modern, long-range expeditionary platform that—unlike most of China's other naval acquisitions of the past two decades—seems to have been designed from the outset for missions other than supporting an attack on Taiwan. Also, while smaller and much less capable than a true aircraft carrier, China's single Type 071 LPD is the PLAN's first true deck-aviation ship, in that unlike destroyers and frigates, it can operate a larger number and more diverse mix of helicopters against a larger set of missions. Modern force projection is essential for China to have a sustained naval presence away from Chinese waters, whether in the South China Sea, the Indian Ocean, or anywhere else. Additionally, authoritative publications from the PLAN, as well as the People's Liberation Army's (PLA's) National Defense University and Academy of Military Sciences, provide clues regarding how the navy intends to employ these platforms in both traditional and nontraditional ways. It is necessary to understand China's future force-projection capabilities, in light of PLA doctrine, to predict the types of missions that Chinese aircraft carriers and large amphibious vessels are likely to be given.

## AIRCRAFT CARRIERS

Probably the most commonly cited example of China's desire to expand its naval power beyond Chinese coastal waters is Beijing's pursuit of aircraft carriers capable of operating conventional fixed-wing fighter aircraft.[3] The PLAN has been interested in acquiring aircraft carriers for decades, but financial, technological, political, and strategic constraints have prevented serious progress. Outside of China, discussion of this issue is highly polarized, to say the least. To some, China's pursuit of aircraft carriers represents a direct challenge to the United States and clearly indicates that China seeks to project naval power into the Indian Ocean and western Pacific. To others, China's aircraft carrier program is nothing more than a quixotic exercise in national vanity; in their view, any Chinese carrier would be nothing more than a nationalistic showpiece, with very little operational value.

Further confusing the situation is Beijing's own obfuscation. Despite years of interest in aircraft carriers and, evidence indicates, experimentation with aircraft carrier technology, as late as 2004 Chinese officials, including General Xiong Guangkai, then deputy chief of the General Staff, stated that China did not plan to build carriers.[4] One year later, the unfinished Soviet *Kuznetsov*-class aircraft carrier *Varyag,* which China had purchased from Ukraine in 1998, went into dry dock at Dalian Shipyard, in northern China, for an extensive refit that continues

at this writing. Today anyone with access to the internet can track the extensive modifications to the ship in photographs posted on a number of blogs and websites. Five years after the ship first entered dry dock, even the most skeptical observers are convinced that China intends to put the ship into operation in the not-very-distant future.

Roughly coincident with work on *Varyag,* Chinese rhetoric on this issue has shifted considerably, with officials and the media discussing aircraft carriers with increasing candor.[5] These include positive statements in April 2009 regarding aircraft carriers by Defense Minister Liang Guanglie and Admiral Wu Shengli, commander of the PLAN, as well as a March 2010 editorial in the English-language version of the *Global Times* stating that it was time for the world to prepare for a Chinese aircraft carrier.[6] Earlier, in November 2008, Major General Qian Lihua of the PLA had asserted China's right to possess an aircraft carrier: "The question is not whether you have an aircraft carrier, but what you do with your aircraft carrier. . . . Even if one day we have an aircraft carrier, unlike another country, we will not use it to pursue global deployment or global reach."[7]

In addition to *Varyag,* China is also developing the aircraft that will compose the ship's air wing. Press and internet reports claim China is producing a Chinese carrier fighter based on the Russian Su-33 Flanker D, designated the J-15; according to one website, the first prototype of this aircraft made its maiden flight on 31 August 2009 and its first takeoff from a land-based "ski jump" (runway ending in an upward ramp) on 6 May 2010.[8] While the exact dates of these flights cannot be confirmed, recent internet pictures show a Chinese Flanker-variant prototype in flight with the same canards and shortened tail stinger as the Russian carrier-capable Su-33; a video of the prototype flying is also on the web. While externally the J-15 appears to be a near copy of the Su-33, internally it likely possesses the same radar and avionics as China's domestically produced land-based Flanker, the J-11B. It will probably be capable of employing a full suite of China's most advanced air-to-air and air-to-ground munitions, including the PL-12 active-radar-homing, medium-range, air-to-air missile.[9]

As an airborne-early-warning (AEW) platform, China may acquire, according to the Russian press, nine Ka-31 AEW helicopters. However, internet photographs indicate that China has fielded a prototype AEW variant of the Z-8 medium-lift helicopter.[10] It is unknown which will be chosen as the primary AEW helicopter for the PLAN's aircraft carrier force. It is possible the PLAN sees an indigenous platform based on the Z-8 as a long-term solution, with Ka-31s from Russia as gap fillers. Alternatively, the Z-8 prototype could also be a test bed for an AEW variant of a more modern helicopter, such as the developmental Z-15.[11] Any of these would be much less capable than a fixed-wing AEW platform, such as the America E-2C Hawkeye.

## PLA THEORY AND AIRCRAFT CARRIER EMPLOYMENT

How the PLAN would employ an aircraft carrier is open to speculation; these versatile platforms can perform a variety of missions. The development in China of a theoretical construct of how the PLAN would employ aircraft carriers dates back to at least the early 1970s, when Liu Huaqing led a feasibility study on the construction of aircraft carriers. Later, as the service's commander (from 1982 to 1988), Admiral Liu pushed for the serious study of aircraft carrier design, asserting that given China's more than three million square kilometers of sea territory, aircraft carriers were necessary to safeguard the nation's rights and interests at sea, enhance national prestige, and add to the nation's peacetime deterrent posture.[12] In 1987, Admiral Liu directed the establishment at the Guangzhou Naval Vessels Academy of a course to train PLAN pilots to command surface combatants; the first class of nine officers graduated with bachelor's degrees in ship command in 1991.[13] Apparently, the PLAN has chosen to follow the American model of selecting its aircraft carrier commanding officers from the naval aviation community. After commanding the PLAN, Admiral Liu served as vice chairman of the Central Military Commission (from 1989 until retirement in 1997); there he continued to argue the case for aircraft carriers.[14]

More recently, authoritative PLA publications on this issue, including 战役学 (*Science of Campaigns,* in 2000 and 2006 editions) and 战役理论学习指南 *(Campaign Theory Study Guide),* provide clues into Chinese thinking on this issue. It is possible, by studying these and other publications, to glean insights into how the PLAN is thinking about employing aircraft carriers operationally.

It is in the South China Sea that one should expect first to see the PLAN employ aircraft carriers. While China's military modernization is primarily geared to deterring independence-minded forces on Taiwan, the only combat that the PLAN has actually engaged in over the past forty years has been in the South China Sea. These clashes occurred in 1974, when Chinese forces captured the Paracel Islands from South Vietnam; in 1988, when PLAN forces captured Johnson Reef in the Spratly Islands and sank three Vietnamese supply vessels; and in 1995, when PLAN forces occupied Mischief Reef, claimed by the Philippines.[15] Recent statements from Beijing—in response to expressions of concern from Washington over competing maritime claims there and the potential threat to navigation—regarding China's sovereignty over islands and surrounding waters in the South China Sea have brought new and increased international attention to this area of key Chinese national interest.[16] China claims a substantial portion of the South China Sea as its territorial waters, and competition is growing among the nations of the region over fishing waters and potential oil and natural-gas deposits. Accordingly, the PLAN has a need for an ability to project force and to employ sea-based airpower against enemy-held islands and reefs. PLA doctrine clearly

lists providing air cover to landing operations as a primary wartime mission, a mission the Chinese see for PLAN aircraft carriers. Both editions of *Science of Campaigns* discuss the importance of aircraft carriers in providing air cover to amphibious invasions against islands and reefs beyond the range of land-based aircraft, a clear reference to their potential use in the South China Sea. The 2000 edition points to the employment of USS *Independence* (CV 62) in this role during Operation URGENT FURY, the 1983 invasion of Grenada.[17]

*Science of Campaigns* also clearly states that three-dimensional attacks are essential to executing the PLA's "coral-island-assault campaign" (对珊瑚岛礁进攻战役) against islands and reefs in the South China Sea during a regional conflict. The 2006 edition of the book, which first detailed this campaign, discusses requirements for effective seaborne command and control, three-dimensional encirclement, and the complex logistics support required for assaults on coral islands and reefs far from the mainland.[18] An aircraft carrier, with its fighter and rotary-wing aviation assets and command-and-control facilities, would be tailor-made for the purpose. Additionally, even one or two carriers would be sufficient to enforce China's territorial claims in the South China Sea against such competitors as Vietnam, the Philippines, or Malaysia, should Beijing attempt again to acquire territory as it did in 1974, 1988, and 1995.

*Overall, it is likely that China views the primary role of its carriers as regional in nature—defending China's maritime claims in East Asia.*

A similar analysis appears in a book published in 1998, *Winning High-Tech Local Wars: Must Reading for Military Officers.* It asserts that amphibious forces engaged in "long distance" landing operations should be protected by one or two aircraft carrier groups stationed 100–150 nautical miles from the shore of the objective. In this discussion it is apparent the authors had in mind non-Taiwan landing operations, since the Taiwan Strait is only about one hundred nautical miles wide.[19] Royal Navy aircraft carriers in the Falklands War in 1982 (despite their small and austere air groups) and British and French carriers in the 1957 Suez crisis (notwithstanding air wings less capable than those of contemporary U.S. carriers) demonstrated that even limited carrier-based airpower can be crucial in regional conflicts beyond the range of effective land-based air cover.[20]

*Campaign Theory Study Guide* discusses the employment of aircraft carriers to protect sea lines of communication (SLOCs) in a "sea-traffic-protection campaign." As evidenced by the ongoing deployment of PLAN warships to the Gulf of Aden, this campaign is increasing in importance for the Chinese. In its support, *Campaign Theory Study Guide* argues that the PLA should develop a mixed fleet, with an aircraft carrier, missile destroyers, and nuclear-powered

attack submarines. The guide describes a number of missions to be executed for sea-traffic protection, including air defense and antisubmarine and antishipping warfare, all capabilities that an aircraft carrier could bring to the campaign. A carrier group could also control designated sea areas to ensure the safe passage of merchant ships and air forces are considered a key component of what the authors term "zone cover" forces.[21] Additionally, while the sea-traffic-protection campaign is described as defensive, all PLA defensive campaigns have offensive components. In this case, PLA doctrine describes the importance of organizing sea and air forces to attack enemy elements that pose a threat to sea transport.[22] While carrier-based aviation would not carry sole responsibility for such offensive operations, it could provide a valuable supplement to surface ships, submarines, and land-based aircraft, depending on the type of threat and the proximity of operating areas to Chinese bases.

Beyond specific mentions of aircraft carriers in PLA doctrine, books like *Science of Campaigns* and *Campaign Theory Study Guide* are replete with references to the employment of air forces for air defense and offensive strike, including in a Taiwan contingency. In the latter scenario, the missions discussed for both the PLA Air Force (PLAAF) and PLAN aviation can likely be handled with land-based aircraft. However, in non-Taiwan contingencies fought in the maritime domain farther from the Chinese mainland, it may be necessary to meet air requirements at least in part with sea-based aviation. *Science of Campaigns* discusses the employment of naval air forces for both strike and air-superiority missions in the antiship and counter-sea-traffic campaigns. Additionally, *Air Raid and Anti–Air Raid in the 21st Century* (2002) discusses the importance of long-range fleet bomber and fighter forces in counterstrike operations in the joint anti-air-raid campaign, specifically in attacking sea-based flight decks and in providing air defense for warships.[23] While none of these references refers specifically to sea-based aviation, the stated requirement for naval aviation in these campaigns can be seen as an implicit reference to aircraft carriers, due to the limitations of land-based airpower in long-range maritime operations.

Overall, it is likely that China views the primary role of its carriers as regional in nature—defending China's maritime claims in East Asia. This is consistent with PLA doctrine, which envisions the use of carriers in providing air cover to long-distance landing operations, primarily in the context of scenarios in the South China Sea. Discussion of the employment of aircraft carriers in the sea-traffic-protection campaign is applicable to a wider set of scenarios. However, it is in the South China Sea, with its disputed maritime claims and potential threats to Chinese shipping even in regional conflicts in which China is neutral, that aircraft carriers would most likely be employed to protect China's SLOCs. A primarily regional role for aircraft carriers is also consistent with the theme in

official and unofficial Chinese media of the need for carriers to protect China's extensive maritime territory in the East and South China Seas. As one Shanghai-based military expert states, "Our carrier will definitely not engage with powerful U.S. aircraft carrier fighting groups. But it is enough to be a symbolic threat among neighboring countries like Vietnam, Indonesia, and the Philippines who have territorial disputes with China."[24] This line of discussion is also consistent with Admiral Liu Huaqing's primary argument for aircraft carriers.[25] Rear Admiral Zhang Zhaozhang elaborated in April 2009:

> The Chinese navy does not need to fight in the Atlantic Ocean, the Indian Ocean or at the center of the Pacific Ocean. The Chinese navy follows a proactive defense strategy. However, in order to defend the security of the national territory, marine territories, and the waters within the First Island Chain, this proactive defense strategy does not mean that our navy only stays within the First Island Chain. Only when the Chinese navy goes beyond the First Island Chain, will China be able to expand its strategic depth of security for its marine territories.[26]

It is highly unlikely for three reasons that China will seek to use its carriers to assert U.S.-style sea dominance in the Indian Ocean or elsewhere in what Chinese sources term "far-seas operations."[27] First, current estimates are that China is going to build three or four carriers. Since it is highly unlikely that all of them will be combat ready at the same time, they would find themselves outnumbered and outgunned by the Indian Navy. India itself is looking to field a force of three aircraft carriers, but in the Indian Ocean they would be supported by land-based airpower, including AEW and intelligence, surveillance, and reconnaissance platforms. They could call on India's fleet of submarines for additional support. China's carriers, by contrast, would be operating beyond the support of land-based airpower, with at best minimal support from China's small force of nuclear-powered attack submarines.[28] This also does not even address the possibility of American involvement, which would only make the situation less tenable for PLAN carrier groups operating in the Indian Ocean in wartime. Additionally, even if all of China's carriers were combat ready, security concerns nearer home would likely preclude the PLAN's surging all of its carriers and their escorts into the Indian Ocean, leaving the PLAN significantly weakened vis-à-vis powerful East Asian competitors.

Second, there is also the question of just how much combat capability PLAN carriers will bring to a traditional force-on-force conflict. It can be safely assumed that at the very least the PLAN's first two carriers (to include ex-*Varyag*), and possibly later ones, will employ a short takeoff but arrested recovery (STOBAR)—that is, a ski-jump design. This represents a significant limitation, because ski-jump-equipped carriers are far less capable than U.S. Navy–style catapult-assisted takeoff but arrested recovery (CATOBAR) ships, which employ powerful

steam catapults to launch heavily laden fighter and strike aircraft. STOBAR carriers are forced to operate rotary-wing AEW platforms, which are far less capable than fixed-wing AEW aircraft in terms of range, operating altitude, and the size of the radars they can carry, thereby severely inhibiting the situational awareness of a battle group. For regional operations (e.g., in the South China Sea) this would not be as much of a problem, because PLAN carriers could count on support from land-based AEW aircraft like the KJ-2000 and KJ-200, now in service in the PLAAF. In the Indian Ocean this would likely not be the case. Recent internet reporting claims China has fielded a prototype fixed-wing AEW platform based on the twin-engine Y-7 transport, which is at least superficially similar to the U.S. E-2C, indicating the potential for future carrier use.[29] This raises the possibility that China is looking to field CATOBAR carriers in the future and that its carrier force will ultimately include a mix of CATOBAR and STOBAR ships. However, the Y-7 is considerably larger than the E-2C, itself a challenging aircraft to operate off the U.S. Navy's large carriers. This means that if China is going to field a carrier-capable AEW platform based on the Y-7, the airframe will likely require significant modifications before it is ready for employment at sea.[30]

Third, although the J-15 itself may be able to employ a wide variety of air-to-air and air-to-surface munitions, fighters operating from STOBAR carriers are limited in the fuel and weapons they can carry and so primarily defend their battle groups, rather than acting offensively. Again, in a regional conflict where land-based strike aircraft (such as the JH-7A, H-6G, J-11B, and Su-30MKK/MK2) can be called upon for offensive strikes, this is not a big problem. Outside of East Asia, however, China could not use land-based strike aircraft without air bases in foreign nations.[31] STOBAR carriers, for their part, cannot generate as many sorties as CATOBAR carriers, because they cannot simultaneously launch multiple aircraft, and the *Kuznetsov* and similar designs cannot carry air groups as large as those of American carriers.[32]

These disadvantages, however, are not crucial for regional force projection, because land-based airpower would be available. PLAN carriers, therefore, would likely operate against opponents like Vietnam, in a supporting role—antishipping, island seizure, and sea-traffic protection—as opposed to serving as the centerpiece of offensive fleets deployed thousands of miles beyond Chinese waters.

## VERTICAL ASSAULT: AMPHIBIOUS AIRPOWER

With approximately sixty ships of the type displacing over a thousand tons, including twenty-six landing ships, tank (LSTs) of over four thousand tons, as well as numerous smaller craft, the PLAN possesses one of the world's largest amphibious assault forces. However, it has very little capacity for vertical assault, due to a lack of deck-based aviation. Modernization of this force over the past two

decades has been steady, with the arrival of Type 072II and 072III LSTs and Type 073IV landing ships, medium (LSMs). However, since most of the new ships have replaced older and less capable ships, overall lift capacity has not increased significantly; it is currently no more than two divisions' worth of troops (depending on the combat loadout).[33] This is nowhere near enough to execute an amphibious assault against Taiwan, which would have to be a combined-arms landing on a scale similar to that of the Normandy invasion of June 1944. However, China could employ its current force of LSTs and LSMs in island-assault scenarios, such as the seizure of one of Taiwan's offshore islands (perhaps Jinmen or Matsu) or of small islands in the South China Sea in a conflict with Vietnam or the Philippines. However, their shallow draft and lack of aviation facilities (LSTs have helicopter landing pads but not hangars) make them less than ideal for assault operations beyond China's littoral, such as in a coral-island campaign, and wholly unsuited for long-range expeditionary operations beyond East Asian waters or for nontraditional security operations, such as humanitarian assistance and disaster relief (HA/DR).[34] An article in the July 2010 edition of 舰船知识 *(Naval and Merchant Ships)* states that large amphibious assault ships are necessary for contemporary distant-sea operations, HA/DR, and amphibious missions against islands far from naval and air bases, where such ships would serve as platforms for smaller amphibious vessels, vertical assault, and command and control.[35]

*How the PLAN would employ an aircraft carrier is open to speculation; these versatile platforms can perform a variety of missions.*

China's intention to address the gap in the PLAN's modern long-range expeditionary capability was first made public on 22 December 2006, with the launching of the Type 071 *Kunlunshan* (LPD 998).[36] The Type 071 LPD offers a significant increase in lift capacity and, just as important, the capability to employ a small but flexible air group of helicopters in assault and attack roles. With its long range and large capacity, the Type 071 LPD can operate far from China's shores, engaging in a wide range of missions, from amphibious assault and vertical envelopment (the insertion of troops by airdrop or air landing) to humanitarian aid to areas stricken by natural disasters and evacuation of Chinese citizens trapped in war-torn nations.[37] However, with only one ship operational and a second under construction, long-range assault capability is still quite limited. It is unknown how many LPDs the PLAN intends to build, with estimates ranging from two ships to eight.[38]

In addition to the Type 071 LPD, the press reports that China plans to build the Type 081 LHD (helicopter assault ship), similar in size and capability to the French *Mistral*-class LHD, or approximately half the size of the U.S. Navy *Wasp* class. In June 2007, American defense analyst Richard Fisher, of the International

Assessment and Strategy Center, reported that Chinese sources at an international maritime trade show in Singapore (IMDEX-07) claimed that the Type 081 LHD would displace approximately twenty thousand tons, have the capacity to transport five hundred troops, and be configured for helicopter-based vertical assault.[39] A three-part series of articles in the Chinese journal 当代海军 *(Modern Navy)* asserts the importance of developing a balanced force of amphibious assault ships of both the LPD and LHD types, due to their complementary capabilities, citing the U.S. Navy's force of LPDs, LSDs, and LHA/LHDs as an example.[40] Chinese authorities, including Admiral Liu, have also speculated on the utility of helicopter carriers, either as versatile platforms in themselves or as stepping-stones to aircraft carriers proper.[41]

Beyond press speculation, very little is known about the Type 081 program in terms of how many platforms the PLAN will acquire (if any) or what capabilities they would possess. Chinese sources at IMDEX-07 stated that China had the capability to construct a helicopter assault ship of the type. This is no doubt true, given likely similarities in hull design between the Types 071 and 081. The July 2010 *Naval and Merchant Ships* article already mentioned calls for a Chinese LHD that would approximate the USS *Wasp* class in size (approximately forty thousand tons) and capability (up to forty helicopters and one thousand troops) but without the specialized facilities to operate fixed-wing aircraft (for *Wasp,* the V-22, AV-8B, and F-35, or Joint Strike Fighter).[42] In any case, China has yet to begin construction on such a platform, much less integration into its force structure.[43]

## FUTURE EMPLOYMENT OPTIONS

The highest projections for modern Chinese amphibious assault ships are for eight Type 071 LPDs and six Type 081 LHDs, but American, Indian, and Taiwanese defense analysts have all assessed that the PLAN will acquire six Type 071s and three Type 081s. Fisher claims that China intends to build three amphibious task groups, each based around one Type 081 and two 071s.[44] It is possible (perhaps likely) that these analysts obtained their information from the same source—they may even be quoting one another—and that the projection of three Type 081 LHDs and six Type 071 LPDs probably represents a high-end estimate for the Chinese navy's future long-range amphibious force. A force of this size would permit the PLAN to field something akin to three American-style expeditionary strike groups, if it desired to organize its forces in such a manner. While this sounds impressive, in reality it represents enough lift for only between 4,500 and 6,500 troops, about one of the South Sea Fleet's two marine brigades. Moreover, that estimate assumes that all of the ships are operational and fully mission capable at the same time, a rare occurrence in any navy. It should also be noted that such a force could employ in total between forty and seventy helicopters of

various types, depending on mission requirements. Yet the PLAN only has about thirty-five rotary-wing aircraft of all types, most of which are smaller Z-9 and Ka-28 helicopters, geared toward antisubmarine warfare and search and rescue.[45] The PLAN's current inventory of fifteen Z-8 medium-lift helicopters is wholly inadequate to support an expanded force of amphibious-assault vessels. The PLAN needs to address this weakness if it is to field a robust vertical-assault capability. The entrance into service of additional Z-8s, a more modern heavy-lift design reported to be in development, or a militarized version of the modern medium utility helicopter, the Z-15, currently in codevelopment with Eurocopter, might help in this regard.[46]

While some analysts speculate that one of the primary missions of China's future fleet of oceangoing amphibious vessels would be to contribute to an invasion of Taiwan (providing a credible means to assault Taiwan's east coast), it is unlikely the PLAN envisions a Taiwan scenario as the primary mission for LPD 998 or any future vessels of similar capacity. First, while the notion of employing such vessels against Taiwan's exposed eastern side is intriguing at first glance, it would mean deploying a significant number of the PLAN's most modern warships —not only its most modern assault ships but also escort vessels—into the Philippine Sea, where they would be highly vulnerable to U.S. attack submarines. Second, as stated above, even three LHDs and six LPDs would be able to carry only about a brigade of marines. The Chinese would need far more, as well as the necessary supplies, in order to present a credible threat and sustain operations once a bridgehead was established. The lift that would be needed is far beyond even the most forward-leaning estimates of China's intentions. Third, it is unlikely the PLAN would be willing to risk these vessels as part of a more conventional assault across the narrow confines of the Taiwan Strait, where they would be at risk from Taiwan navy fast attack craft and coastal-defense antiship cruise missiles. Fourth, the fact that LPD 998 is in not the East Sea Fleet but the South Sea Fleet (based almost twice as far from the Philippine Sea, where it would need to operate to assault Taiwan's east coast) is highly suggestive of the platform's roles and missions. Future ships in this class could be based with the East Sea Fleet, but the operational problems stated above would still apply.

As with aircraft carriers, for the missions of the Type 071 LPD and similar future platforms one needs to look to the South China Sea and not to Taiwan. *Campaign Theory Study Guide, Science of Campaigns,* and *Winning High-Tech Local Wars* all discuss the use of rotary-wing forces in the vertical-envelopment role. While China's military modernization is primarily aimed at deterring independence-minded forces on Taiwan, it is to the three-dimensional assault role in the PLA's coral-island-assault campaign, beyond the range of land-based helicopters, that large assault ships such as LPDs and LHDs are best suited.[47] Their aviation

capabilities, large troop- and cargo-carrying capacity, and command-and-control facilities are ideal for this sort of campaign.[48] In November 2008 and June 2009, for instance, LPD 998, in the company of destroyers, frigates, and supply ships, conducted long-distance patrols of the disputed waters in the Spratly Islands; PLAN marines carried out at least one island-seizure exercise. This is suggestive of the primary operational orientation of this warship.[49]

China could employ aircraft carriers in a similar way. It is unlikely that the PLAN, apparently planning an LHD type, views vertical-assault operations as a primary mission for an aircraft carrier. Nonetheless, vertical assault represents a legitimate and proven use for carriers. The U.S. Navy has often employed them in this role. Notable examples include the launching of helicopters from USS *Nimitz* (CVN 68) in 1980 for Operation EAGLE CLAW, the failed mission to rescue American hostages in Iran; RESTORE DEMOCRACY in Haiti in 1994, when USS *Dwight D. Eisenhower* (CVN 69) embarked soldiers and helicopters from the 10th Mountain Division; and the early stages of ENDURING FREEDOM in 2001, when USS *Kitty Hawk* (CV 63) served as the "afloat forward staging base" for U.S. Army and Air Force special-operations troops and helicopters.[50] The author of "How Big a Role Do Aircraft Carriers Play in Noncombat Operations?," published in 2009, discusses the role of *Eisenhower* off Haiti in 1994, arguing that it is sometimes necessary to reorganize a carrier's air group for nontraditional security missions, removing some or all of its fixed-wing aircraft to make room for additional helicopters.[51]

Additionally, there are references in *Campaign Theory Study Guide* to the use of helicopter-carrying vessels (e.g., converted merchant ships, as mentioned in the sea-traffic-protection campaign) to conduct a variety of missions.[52] Amphibious assault ships, particularly LHDs, with their rotary-wing aviation capabilities, could represent valuable supplements to aircraft carriers and other surface combatants engaged in SLOC protection. The recent deployment of LPD 998 to the Gulf of Aden for counterpiracy operations with a mix of Z-8 and Z-9 helicopters specially fitted with gun and rocket pods was an excellent example of such a use of an assault ship in sea-traffic protection. Throughout the PLAN counterpiracy mission, helicopters have been crucial for shuttling special-operations forces to merchant ships and in warding off suspicious boats.[53] LPD 998, employing Z-8s, can accomplish these missions more effectively than destroyers and frigates employing smaller Z-9s and Ka-28s.

## NONTRADITIONAL SECURITY MISSIONS FOR SEA-BASED AIRPOWER

In addition to combat missions in regional conflicts, it is likely that China views aircraft carriers and large assault ships as important platforms for nontraditional security missions. As stated above, the best example so far is the decision to

deploy LPD 998 on counterpiracy duty in the Gulf of Aden as part of China's sixth counterpiracy rotation. Other nontraditional missions include maritime antiterrorism, prevention of maritime transportation of weapons of mass destruction, maritime peacekeeping, HA/DR, and noncombatant evacuation operations (NEOs). While it is unlikely that the PLAN views such missions as primary roles, these are tasks that navies often find themselves engaged in on a day-to-day basis. Nontraditional security missions also provide a useful occasion for the PLAN to operate in East Asian waters and beyond in a manner that does not inflame "China threat" rhetoric. In fact, they would present China as a responsible state that takes international-security issues seriously and is willing to promote cooperation and stability.[54] These missions also provide useful on-the-job training for the PLAN; Captain Xu Ping writes in the influential journal 中国军事科学 *(China Military Science)* that nonwar military actions are becoming one of the best forms of training, testing, and enhancing the core military functions that are necessary for winning local wars under "informatized" conditions.[55]

A significant example is humanitarian assistance and disaster relief. It is known that China was embarrassed in the aftermath of the 26 December 2004 Indian Ocean tsunami when the PLAN was obliged by a lack of suitable platforms to stand on the sidelines as several other countries, including the United States, Japan, India, and Thailand, deployed naval forces to provide humanitarian relief. As China develops its force of amphibious assault ships and eventually aircraft carriers, it is likely that they will be employed in HA/DR in East Asia and outside China's regional seas in areas such as the Indian Ocean. One Chinese article discussing the role of naval forces in disaster relief specifically names Cyclone Nargis (which struck Burma on 27 April 2008). An article on the 2004 tsunami, which struck Indonesia primarily, points out that the tidal waves also hit India and Sri Lanka.[56] The deployment of a task group built around one or more assault vessels to the Indian Ocean to provide disaster relief could go a long way in quieting fears of a growing regional Chinese military presence. Participation in HA/DR operations in the Indian Ocean would also allow the PLAN to establish an increased presence in the region in a nonintrusive, even friendly, manner that would likely find approval within the international community. Additionally, like the ongoing counterpiracy deployments, such missions would provide valuable experience in operating in close proximity to other major naval forces.[57]

While aircraft carriers lack some of the specialized support and logistics capabilities of amphibious assault ships for HA/DR operations, China will still likely employ its carriers for this mission in East Asia and possibly farther abroad. Chinese commentators have noted the important role that USS *Abraham Lincoln* (CVN 72) played in relief operations after the Indonesian tsunami in 2004. The participation of the light carrier USS *Saipan* (CVL 48) in disaster relief in the

Caribbean and Mexico in 1954 and 1955 is also discussed.[58] While the launching of even a single, refurbished, Soviet-era aircraft carrier will cause some to point to a growing China threat, the positive news of the deployment of a PLAN aircraft carrier to a coastal disaster area in East Asia will be a diplomatic counterweight to all but the most extreme trepidations. As Professors Andrew Erickson and Andrew Wilson of the U.S. Naval War College state, "The aftermath of the 2004 tsunami has convinced many Chinese that good carriers make good neighbors and they are a necessity if China's force structure available for deployment to Southeast Asia is to match and complement its diplomatic initiatives."[59]

Beyond HA/DR, aircraft carriers and modern amphibious assault ships are well suited to a variety of other nontraditional security operations as well. The October 2008 issue of *Modern Navy* featured a spirited debate among three Chinese naval experts (including Senior Captain Li Jie of the Navy Military Studies Research Institute) regarding the advantages of amphibious assault ships over aircraft carriers. The discussion revolves around the suitability of amphibious assault ships in such operations as maritime antiterrorism, counterpiracy, prevention of maritime transportation of weapons of mass destruction, and maritime peacekeeping, Li arguing that using an aircraft carrier to execute such missions is like using an "ox cleaver to kill a chicken."[60] Li also points out that amphibious assault ships appear far less threatening than aircraft carriers, while providing greater flexibility afforded by their air and sea-based assault capabilities and extensive medical facilities.[61] Another article in the same published debate states, "Amphibious warships are able to shoulder or accomplish most of the tasks done by mid to small-size aircraft carriers, and are even able to engage in tasks that some of the carriers are unable to do."[62]

*Modern force projection is essential for China to have a sustained naval presence away from Chinese waters, whether in the South China Sea, the Indian Ocean, or anywhere else.*

It is in nontraditional security missions that China would likely employ aircraft carriers and amphibious assault vessels in "far seas" operations. There is no evidence that China is developing sufficient force projection to launch a major offensive against another state; the level of capability it is likely seeking would be sufficient for a variety of other missions. Since late December 2008 the PLAN has maintained two warships (destroyers or frigates) and one supply ship in the Gulf of Aden in counterpiracy patrol, as well as, recently, LPD 998. These ships have escorted a substantial number of merchant vessels and deterred some pirate attacks, but they lack the capability to take firm action against pirate bases ashore should they be called upon to do so. United Nations Security Council Resolution (UNSCR) 1851, passed unanimously in December 2008, authorizes operations against pirate bases on land in Somalia.[63] No nation has taken such action under

UNSCR 1851, but should the Chinese decide to do so, the small helicopters and modest special-operations troops now deployed with the destroyers and frigates would be insufficient. LPD 998, with its larger Z-8 helicopters and LCACs (landing craft, air cushion), would make a PLAN group capable of acting under UNSCR 1851. Should the international community attempt to address piracy in Somalia by deploying a multinational force for peacekeeping and nation building, PLAN amphibious assault ships could offer transportation and logistics support to PLA soldiers involved.

Protecting Chinese citizens in nations bordering the Indian Ocean is another task that PLAN expeditionary units could carry out. It is estimated that over five million Chinese citizens live and work overseas, including forty-five thousand in Nigeria, twenty-four thousand in Sudan, ten thousand in the Democratic Republic of the Congo, and ten thousand in Pakistan. Chinese citizens living in unstable countries like these are increasingly at risk. In April 2007, seven Chinese oil workers were killed in Ethiopia; another five were abducted and murdered in Sudan in 2008. In 2004 three Chinese engineers were murdered in Gwadar, while in 2007 a busload of Chinese construction engineers was bombed in southwestern Baluchistan, killing several policemen.[64] Most recently, in July 2010 Chinese oil workers staying at a hotel in Gwadar were subjected to a rocket attack.[65] Also, about half of the approximately two thousand Chinese soldiers currently deployed on UN peacekeeping missions are in Sudan and the Democratic Republic of the Congo, nations where future instability could lead to a requirement for sea-based support.[66]

In May 2007 China's Ministry of Foreign Affairs (MFA) established a division of consular protection within the Department of Consular Affairs, MFA's largest department, with 140 staff in Beijing and more than six hundred at overseas consulates. Although diplomatic channels have secured the release of kidnapped Chinese citizens, including nine people in Nigeria in 2007 and twenty-five Chinese sailors on the pirated coal carrier *Dexinhai* (released in December 2009 after payment of a four-million-dollar ransom), growing Chinese nationalism and confidence in the military could put pressure on Beijing to take more muscular action in the future.[67] A naval task group built around one or more large amphibious vessels would be crucial in conducting a NEO or in providing over-the-horizon support to Chinese peacekeepers. Amphibious assault ships would bring a wide range of capabilities to such a task, including diverse air wings, made up of transport, rescue, and attack helicopters; task group command and control; medical facilities; and marines and soldiers supplemented by specialists such as engineers and medical personnel.

The February and March 2011 deployment of a single PLAN frigate and four PLAAF Il-76 transports to support a Chinese NEO in war-torn Libya are excellent

examples of the PLA's need for greater expeditionary capability. While this mission represents the first time China deployed military forces to support a NEO, the PLA's contribution to the mission was unimpressive. By the time PLAN and PLAAF forces arrived in theater, over 90 percent of the approximately thirty-five thousand Chinese citizens in Libya had already been evacuated, using chartered commercial ferries and aircraft. The mission generated a great deal of positive publicity for the PLA in the largest evacuation of Chinese citizens from a foreign country since the founding of the People's Republic, and it demonstrated the PLA's ability to respond quickly to execute its mission. However, the small role played by China's military forces in this operation highlights its lack of substantive long-range expeditionary capabilities. That said, an indicator of a more robust role for the PLA in this type of mission is this March 2011 statement from Major General Luo Yuan of the Academy of Military Sciences in the Chinese newspaper *Xinhua:* "If there's an emergency and there are a huge number of overseas Chinese needing to be evacuated, then it's quite necessary for the army to step in and help the government get them out."

Given the likelihood that the primary focus of China's future aircraft carrier fleet will be regional, any deployments of Chinese carrier groups outside the western Pacific will probably be to support nontraditional security missions or establish a peacetime presence. While not as useful as large amphibious assault ships for NEOs, counterpiracy, support to peacekeeping, and the like, carriers could provide air cover or rotary-wing support to Chinese forces engaged in these missions were it necessary. A carrier group deployed near a nation where Chinese citizens were threatened could also serve as a powerful instrument of diplomacy. Further, if the commitment elsewhere or unreadiness of other forces required, a carrier (though not ideally suited to the role) could put assault forces ashore against pirate lairs. The use of *Kitty Hawk* as an afloat forward staging base in 2001 for special-operations forces is instructive in this regard. China could also deploy carrier groups to the Indian Ocean periodically on goodwill cruises and bilateral or multilateral exercises. That peacetime presence might support nations important to China's position in the region, such as Pakistan and Sudan, or effectively assert to regional actors that China's interests and concerns are not to be ignored.

China's navy currently possesses only a modest long-range force-projection capability. However, between now and 2020 the acquisition of aircraft carriers and additional amphibious assault vessels will give it a robust capacity for expeditionary and force-projection operations in East Asia. It will also give the PLAN the ability to engage in small or medium-sized missions of these kinds both in and beyond East Asia—particularly in support of nontraditional security missions,

such as counterpiracy, support to peacekeeping forces, noncombatant evacuation, humanitarian assistance and disaster relief, and peacetime presence. While the PLAN's overall expeditionary potential will likely be closer to that of the British and French navies than that of the U.S. Navy, its aircraft carrier and amphibious forces will still likely be the most powerful of any East Asian nation. A force of this size will not be sufficient to project force beyond East Asian waters, but it should be enough to protect China's regional maritime interests and contribute significantly to Chinese diplomacy outside East Asia.

While it cannot be predicted with certainty how China will seek to employ its aircraft carriers and modern amphibious assault ships, authoritative open-source publications offer important insight into the potential operational roles of these platforms in both wartime and peacetime. More important, these writings clearly show that the Chinese military is aware of the flexibility of aircraft carriers and modern assault ships and likely views them as more than simply "one mission" platforms. Instead, they suggest, it will seek to employ them in a variety of traditional and nontraditional security missions in order to accomplish "diversified military tasks."[68]

## NOTES

The views expressed in this article are those of the author and do not necessarily reflect the views of the Department of the Navy or Department of Defense.

A modified version of this article appears as a chapter in Andrew S. Erickson and Lyle J. Goldstein, eds., *Chinese Aerospace Power: Evolving Maritime Roles* (Annapolis, Md.: Naval Institute Press, May 2011).

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# A NEW CARRIER RACE?

## Strategy, Force Planning, and JS *Hyuga*

*Vice Admiral Yoji Koda, Japan Maritime Self-Defense Force (Retired)*

On 18 March 2009 JS *Hyuga* (DDH 181) was commissioned and delivered to the Japan Maritime Self-Defense Force (JMSDF). The unique characteristic of this ship is its aircraft-carrier-like design, with a "through" flight deck and an island on the starboard side. *Hyuga* was planned in the five-year Midterm Defense Buildup Plan (MTDBP) of 2001 and funded in Japanese fiscal year (JFY) 2004 as the replacement for the aging first-generation helicopter-carrying destroyer (DDH), JS *Haruna* (DDH 141), which was to reach the end of its service life of thirty-five years in 2009. The second ship of the new class, JS *Ise* (DDH 182), of the JFY 2006 program, was commissioned 16 March 2011. A third DDH, an improved sister of the *Hyuga*-class ships, was funded in the JFY 2010 budget. The fourth and last DDH, most likely to be a second ship of the improved type, is to be built in the next five-year program, from JFY 2011 to 2015 (see figure 1 and sidebar).

Several navies have built ships of this type since the mid-1990s. These ships and their navies include HMS *Ocean* (L 12) of the Royal Navy, the *Mistral* (L 9013) and sisters of the French navy, *Cavour* (C 550) of the Italian navy, *Rey Juan Carlos I* (L 61) of the Spanish navy, and two amphibious assault ships (LHDs) of the *Canberra* class in the Royal Australian Navy. In addition, the Republic of Korea Navy also operates *Dok-do* (LPH 6111), which clearly belongs in this category, and it is reported that two more of the class will be built.

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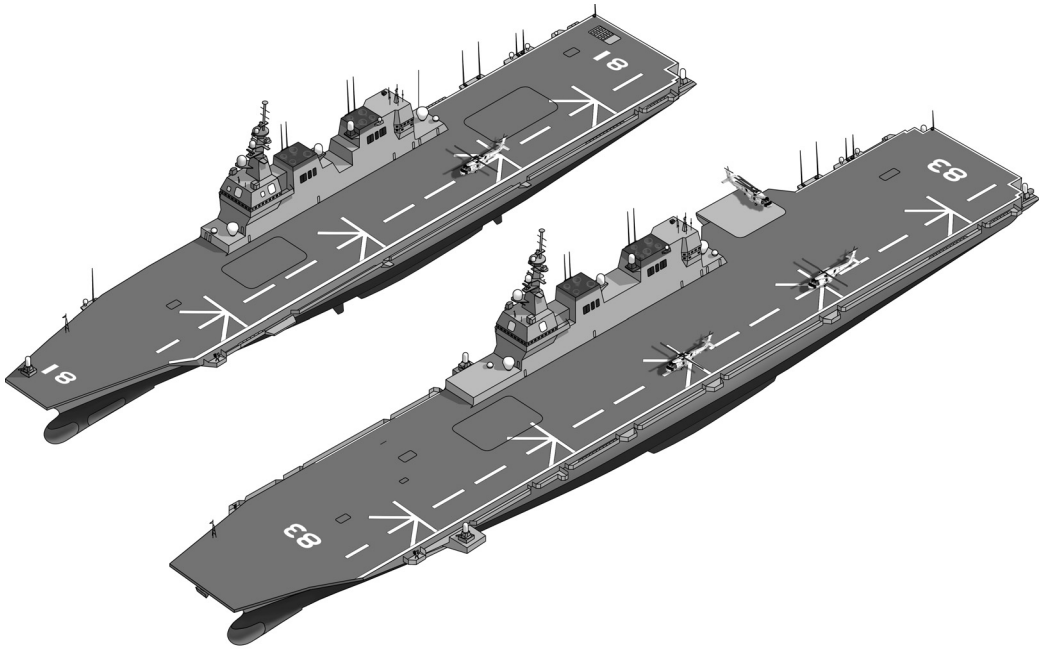
*Naval War College Review, Summer 2011, Vol. 64, No. 3*

**FIGURE 1**




*Hyuga* (left) and improved sister ship

*Sekai no Kansen*

There are also aircraft carrier programs of other types in various navies. These other carriers are intended more for the strike mission than for other military roles. It is reported that the Royal Navy and French navy are jointly pursuing a new carrier program. At the same time both the People's Liberation Army Navy of China and the Indian navy are on track to build their own strike carriers.

This article focuses on multipurpose through-deck carriers—not strike carriers, which will not be discussed here. Specifically, it examines the related maritime and naval strategy and force-planning concept of the JMSDF, using JS *Hyuga* as the focus of the analysis.

*Hyuga* realizes a long-lasting dream and goal of the JMSDF, which has wanted to be a truly capable maritime force, with escort—that is, antisubmarine warfare (ASW)—carriers. As we will see, the concept of "escort carrier" in the JMSDF changed several times in the process that led to the construction of *Hyuga.*

In 1952, seven years after the end of the Second World War, the Japan Maritime Guard (JMG) was established as a rudimentary defense organization for the nation. The leaders of the JMG were determined that the organization would be a navy, not a reinforced coast guard. Most were combat-experienced officers (captains and below) of the former Imperial Japanese Navy, and they had clear understanding of the difference between a coast guard–type law-enforcement force and a navy. Two years later, the JMG was transformed into the JMSDF, and

with leaders whose dream to build a force that had a true naval function was stronger than ever.[1] However, they also knew the difficulty of rebuilding a real navy, in light of strict constraints imposed by the new, postwar constitution.[2]

Nonetheless, the JMSDF has built its forces and trained its sailors vigorously, with this goal in view, and it is today one of the world's truly capable maritime forces in both quality and size. The commissioning of *Hyuga* represents another step in its growth during the fifty-seven years since its origins in the JMG. The ship also reflects the service's strategy, the rationale of its force planning, and the operational concepts of its well-balanced fleet. As background, it is necessary to understand the relationship between the defense strategy of Japan and the JMSDF.

## THE DEFENSE STRATEGY OF THE JMSDF

Since the founding of the Japan Self-Defense Force (JSDF) and within it the JMSDF, in 1954, the defense strategy of Japan has been based on the Japanese-U.S. alliance. This posture was clearly established by article 4 of Japan's Basic Policy for National Defense, which was adopted by the National Defense Council and approved by the cabinet on 20 May 1957.[3] The three major defense policy documents that have appeared since then—National Defense Program Outlines of 1977 and 1996 and the National Defense Program Guideline of 2005—have all confirmed that the bases of Japan's national security and defense are the capability of the JSDF and the Japanese-U.S. alliance.[4]

### SELF-DEFENSE FORCE BUILDING PROGRAMS

Four years after the foundation of the Self-Defense Force, the government of Japan began midterm defense buildup programs to provide for systematic force building and transparency for Japanese taxpayers. Data through 2009 are drawn from *Boei Handbook of 2009* [Handbook for Defense 2009] (Tokyo: Asagumo Shinbunshya, 2009), pp. 17–146.

1954–57: four single-year budgets
1958–60: First DBP (three-year program)
1961: Single-year budget
1962–66: Second DBP (five years)
1967–71: Third DBP (five years)
1972–76: Fourth DBP (five years)
1977–79: Three single-year budgets (Post–Fourth DBP)
1980–84: 1978 Five-year JDA draft (not government program; to be reviewed at the fourth year, 1983)
1983–87: 1981 Five-year JDA draft (not government program, to be reviewed at the fourth year, 1986)
1986–90: 1986 MTDBP (five years)
1991–95: 1991 MTDBP (five years; amended in 1993)
1996–2000: 1996 MTDBP (five years; amended in 1998)
2001–2005: 2001 MTDBP (five years; amended in 2005)
2005–2009: 2005 MTDBP (five years; amended in 2009)
2010: Due to the political situation in Japan, a single-year budget was accepted by the cabinet on 17 December 2010, together with a 2010 National Defense Program Guideline, in lieu of a five-year (2011–2015) MTDBP.

Fully complying with this concept, the military strategy of the JSDF has been to build and maintain the defense posture of the nation through cooperation with U.S. forces under the alliance. Exceptions would be the outbreak of military conflict or limited aggression against Japan, in which case the JSDF would be solely responsible for appropriate military measures. Thus the operational concept of the JSDF with respect to the U.S. armed forces has been one of complementary mission-sharing, in which U.S. forces concentrate on offensive operations, while the JSDF maximizes its capability for defensive operations. In other words, the two forces form what is known as a "spear and shield" relationship.

For instance, under this policy the Japan Ground Self-Defense Force (JGSDF) remains on Japanese territory and prepares for enemy invasion, while U.S. Army and Marine Corps forces prepare for and conduct expeditionary operations against enemy forces outside Japan. In case of an invasion, these three ground forces would fight together on Japanese soil.

Similarly, the Japan Air Self-Defense Force (JASDF) is to be engaged solely in the defense of Japanese airspace, providing overall safety and security to the Japanese people and to U.S. forces in Japan. Thus the JASDF relieves the U.S. Air Force of the heavy burden of defense around Japan. This enables Air Force units to allocate extra assets for strike and other operations conducted against the enemy.

As for maritime operations, ensuring the safety and security of the waters around Japan is the most important mission of the JMSDF. In this way the JMSDF ensures that Japan can receive American reinforcements from across the Pacific Ocean, guarantees the safety of U.S. naval forces operating around Japan, and enables U.S. carrier strike groups (CSGs) to concentrate on strike operations against enemy naval forces and land targets. At the same time, for Japan, as a country with few natural resources and little domestic food production, the safety of merchant shipping is a matter of national survival in crisis or wartime. All of these operations are grouped under the heading of protection of sea lines of communication (SLOCs) in the northwestern Pacific. The JMSDF has accepted these simple realities as the essence of its strategic objectives.

Proceeding from this defense strategy, the main missions of the JMSDF have consistently been defined as the protection of SLOCs and the defense of the homeland in case of direct invasion. In support of this defense strategy and its two main missions, in turn, the JMSDF has set antisubmarine warfare as its main task. The operational concept under the Japanese-U.S. alliance is that in case of a national or regional contingency, the U.S. Navy would deploy CSGs into the seas surrounding Japan, to provide the strike capability lacking in the JMSDF to oblige the enemy to give up its intention of invading Japan or attacking its SLOCs. It would be necessary to exclude firmly the enemy's submarines,

which could pose the greatest threat to CSG operations in Japanese waters and to the safety of the SLOCs around Japan. As a result of this logic, ASW was made the main pillar of JMSDF missions. Even in the present security environment, twenty years after the end of the Cold War and the threat of invasion from the Soviet Union, two factors are unchanged—the Japanese-U.S. alliance and Japan's dependence on imported natural resources. Therefore the protection of SLOCs has continued to be a main mission of the JMSDF.

Homeland defense, of course, remains as a mission as well, however unlikely its occurrence. It is based on the assumption of a direct invasion into Japan by an enemy ground forces. This would certainly be a state of national emergency, and each branch of the JSDF would do its best to repel the enemy. At the same time, homeland defense operations would involve many unforeseeable factors, such as how and where enemy forces invade and how U.S. forces would assist the JSDF; projecting countermeasures and courses of action for all possible cases is complicated. In any case, certain operations associated with the protection of SLOCs—for example, establishing and maintaining conditions necessary for U.S. forces arriving in the waters around Japan—contribute also to homeland defense.

In other words, it is inappropriate to consider separately the operations required for each mission. Accordingly, the JMSDF has made it a basic policy to address the homeland-defense mission by giving full priority to the warfare capabilities, especially ASW, required for the SLOC-protection mission, in the belief that it can best contribute to Japan's homeland security by defeating invasion forces at sea.

## SHIPBORNE HELICOPTERS, DESTROYERS, AND FRIGATES OF WORLD NAVIES

In addition to the JMSDF defense strategy, some discussion of the historical development of naval helicopters, destroyers, and frigates generally is necessary to understanding the rationale of JMSDF's force buildup, especially in destroyers and helicopters.

Various navies paid close attention after World War II to the improvement of submarine capabilities, numbers, and quality, as well as to the development of helicopters. They made sustained efforts to combine helicopters and surface vessels in order to improve antisubmarine effectiveness. Various combinations were tested, notably with helicopter-capable surface vessels, mainly in the United Kingdom, by the Royal Navy. Directly and indirectly influenced by such efforts, many European navies started in the 1960s to operate small helicopters on board destroyers (DDs) and the smaller, more specialized frigate (FF) type.

The biggest issue was to limit the movement (mainly rolling) of surface ships of only two or three thousand tons—a typical size in those years—enough to make it possible to handle and operate helicopters on board. The Royal Navy had developed successful fin stabilizers for ship's hulls, and their use spread very quickly. As for the shipboard helicopter, small aircraft like the Wasp and Bell 204 were used initially, followed by the Bell 212 and Lynx, with their improved performance. In recent years, however, the growth of the submarine threat and the diversification and complexity of navy missions have led naval force planners to recognize the limitations of small helicopters, such as poor endurance and insufficient combat systems. Therefore, most world navies are today introducing helicopters of medium to large size, like the EH-101 and NH-90. Simultaneously, the Royal Canadian Navy has undergone a unique process in this area. In the 1960s, it developed a concept for the embarkation of a large helicopter, the HSS-2 (later redesignated in the U.S. Navy as the SH-3), a cutting-edge aircraft in those days, on board its 2,500-ton destroyers. Even with fin stabilizers, a destroyer-sized ship could not safely handle, launch, or recover the larger HSS-2 in rough seas. An engineering team from Canada's navy and industry produced an onboard helicopter-handling/arresting system called Beartrap, which became indispensable. In the 1970s, the Canadian navy built four *Iroquois*-class DDHs of 4,500 tons, larger than previous Canadian destroyers; each could carry two HSS-2s. This class underwent modernization in the 1990s, and three units, aged more than thirty-five years, remained in active service as of December 2010.[5]

The U.S. Navy, in contrast, did not for a long period after World War II form a clear concept of combining DD/FF types with helicopters for antisubmarine warfare. Instead, in 1960s and 1970s it used *Essex*-class aircraft carriers as ASW carriers (CVSs), with S-2 antisubmarine maritime-patrol aircraft and HSS-1 (later known as the H-34) and HSS-2 helicopters on board. This was a superb ASW capability, but as the Soviet Union's submarine threat became increasingly prominent, the U.S. steadily endeavored to strengthen its ASW capability, especially that of surface ships in conjunction with P-3 aircraft and state-of-the-art technologies. By the early 1960s, U.S. Navy ships could project Mark 44 homing torpedoes as far as ten thousand yards away, using the ASROC (antisubmarine rocket) system. To extend this range to match longer detection distances, the Americans developed the radio-controlled DASH (drone antisubmarine helicopter); however, the system was abandoned due to technological limitations and poor reliability.[6]

With the failure of DASH, the U.S. Navy started to embark small, multipurpose, manned helicopters on surface vessels. The Navy also introduced the AN/SQR-18A variable-depth-sonar towed-array sonar system (VDS-TASS) and added it to the existing AN/SQS-35 VDS system to detect the relatively noisy

first-generation Soviet nuclear-powered attack submarines (SSNs)—for example, the Hotel, Echo, and November classes—and snorkeling, conventionally powered boats. By this time the Mark 46 torpedo, with substantially improved performance over the previous Mark 44, had become operational too.

The U.S. Navy's concept of ASW operations was now to get initial acoustic ("passive," or listening) contact by VDS-TASS on board destroyers or frigates and then develop the approximate position of the target submarine by continuous tracking. The passive-detection range of TASS is in general much greater than that of a ship's hull-mounted sonar used in an active mode, but also several times greater than the maximum firing range of the ASROC. It thus gives surface units the safety of greater distance, but without an appropriate attack weapon, they cannot take advantage of this long-range detection. It was for this reason that the concept of pairing ships with light helicopters was developed in the U.S. Navy.

In a tactical ASW situation, a surface unit deploys helicopters against the contact to determine whether it is really a submarine. If it is, the helicopter fixes its position using sonobuoys; if the submarine is identified as an enemy, the helicopter attacks it with a Mark 46 torpedo. A new helicopter was developed for not only this sequence and type of operation but also antisurface surveillance and targeting, search and rescue, and transport—the Light Airborne Multi-Purpose System (LAMPS), of which the SH-2 became known as the "Mark I."

Due to its size, the LAMPS Mark I was equipped not with dipping sonar but with magnetic-anomaly-detection (MAD) gear, along with sonobuoys, to fix the location of a submerged boat. Other than ASW systems, the Mark I was also equipped with surface-surveillance radar. This radar system made LAMPS indispensable for over-the-horizon targeting of the new Harpoon surface-to-surface missile (SSM), which had just become operational in the U.S. Navy.

The operational record of the LAMPS Mark I was highly satisfactory. All forty-six frigates of the *Knox* (FF 1052) class, initially planned for DASH, were converted to LAMPS, through redesign of their hangars and installation of sonobuoy data-processing systems. These ships were a mainstay of American ASW through the 1970s and 1980s.

The successor to LAMPS I, known as LAMPS Mark III, was based on the SH-60 helicopter, a standard helicopter in all U.S. services at the time. More than 140 surface vessels embarked the SH-60, ranging from *Oliver Hazard Perry*–class guided-missile frigates to "Flight IIA" *Arleigh Burke*–class guided-missile destroyers (DDGs), and to aircraft carriers. On board Aegis guided-missile cruisers and DDGs equipped with the Aegis combat system, the SH-60 is an indispensable asset. It supports the AN/SQQ-89 comprehensive ASW system, which in turn combines the AN/SQR-19 Tactical TASS (TACTASS), the

AN/SQS-53 hull-mounted sonar, and ASW-related software. The SQQ-89 is considered to be the most advanced surface-ship ASW system in the world today.

## HELICOPTER OPERATIONS IN THE JMSDF: THE MID-1950S AND 1960S

Naval helicopters were introduced in 1953, one year after the foundation of the JMG. In those days, all efforts were focused on obtaining a large number of surface vessels, such as the World War II–vintage patrol frigates and landing support ships, transferred from the U.S. Navy. Emphasis was also placed on training shipboard personnel to meet the rapidly growing requirements of this force.

However, consideration was also given to maritime aviation, in order to pave the way for its future development. This was a legacy from the Imperial Japanese Navy, whose naval aviation force had been the second-largest in the world during World War II but had totally disappeared by the end of the war. In addition to fixed-wing aircraft, such as PV-2s, TBMs, and PBYs—all of which were also of World War II vintage—initial attempts to introduce several types of helicopters, including the Bell 47, were made. This was the period of the Korean War, so it was difficult for the JMG to get helicopters from the U.S. Navy. Therefore, secondhand S-51 and S-55 helicopters were imported from the United Kingdom. These two types were mainly used for pilot training and for establishing operational concepts for the future helicopter force. Later, two squadrons were established, each equipped with eight HSS-1 and nine night-capable HSS-1N helicopters, then cutting-edge U.S. Navy aircraft. Finally the helicopter force of the JMSDF was ready for missions, but its inventory was still very small. At that time, the deployment concept for helicopters in the JMSDF envisioned the defense of vital local areas, such as major ports, straits, and channels; it presumed operation from shore air bases—not from ships.

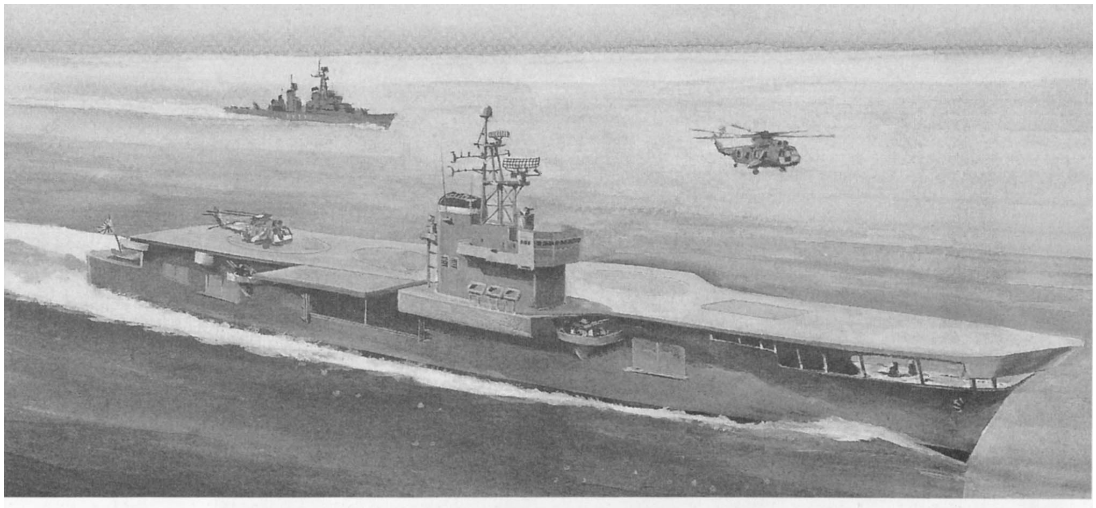
Beyond these practical matters of force planning and building during its early days, the JMSDF had an independent strategic concept, an ambitious plan to build an innovative ASW group, formed around a helicopter carrier. In outline, that concept recognized that surface vessels have natural limitations in antisubmarine warfare; submarines, whether conventionally or nuclear powered, maneuver cunningly and aggressively to avoid detection by surface units before attacking, and nuclear submarines can retreat at high speed after attacking. The inherent limitations of surface ships against these "invisible adversaries" include low probability of detection, difficulty of classification and identification of contacts, short detection range relative to that of a submarine against a surface ship, and the submarine's tactical advantages in tactical use of the ocean environment. To make up for these handicaps, JMSDF planners considered it

indispensable to employ helicopters, with their prominent ASW capabilities, in combination with surface ships. The abilities of helicopters to conduct wide-area surveillance and search and to detect and track fast and hard-maneuvering contacts were especially attractive characteristics. In addition, if a surface force could conduct ASW by helicopters at a distance, its own safety and survivability would substantially increase.

So, on the basis of this thinking, the JMSDF devised a concept for an ASW—or "hunter/killer" (HUK)—group, a small-to-medium-sized ASW helicopter carrier with escort destroyers. To realize this concept, the JMSDF Maritime Staff Office (MSO) in Tokyo developed a plan for two variants: "CVH-a," of twenty thousand tons, with eighteen helicopters and four to six S-2 fixed-wing maritime patrol aircraft; and "CVH-b," of ten thousand tons, with eighteen helicopters (see figure 2).

It was decided that CVH-b would be more suitable for the JMSDF, and the Japan Defense Agency (or JDA, the predecessor of the present Ministry of Defense) decided to request one CVH-b in the JFY 1961 budget. But this decision was caught up in political turmoil originating from stiff opposition to the revision of the Japanese-U.S. Security Treaty in 1960. This political friction, caused by relatively minor opposition groups, escalated into nationwide social chaos. In order that this controversial CVH not become a symbolic target for these opponents, the JDA withdrew its proposal. At the same time, due to the chaotic situation, the second of the JDA's Defense Buildup Plans (DBPs) was postponed by one year; to fill the one-year gap, an independent, single-year budget, for JFY

**FIGURE 2**



2次防で建造が検討されたCVHの想像図。

The CVH-b (conceptual image)

*Sekai no Kansen*

1961, not part of a five-year DBP, was requested. CVH construction was not included and was never discussed again in later years. This was the first demise of the JMSDF helicopter carrier.[7]

In the late 1950s and early 1960s, the JMSDF started receiving the seven destroyers of the *Ayanami* class (2,200 tons, ASW, three-inch guns) and the three sisters of the *Murasame* class (2,400 tons, antiair warfare [AAW] and antisurface warfare, five-inch guns). These were the JMSDF's first generation of DDs, planned from 1955 to 1958. Construction of its first state-of-the-art DDG, of 4,500 tons, with the Tartar surface-to-air missile (SAM) system, was approved in the 1961 JDA budget. For the JMSDF, a DDG was too expensive to build in large numbers, so the JMSDF traded quantity for its superb AAW capability. This request was regarded as something of a "leap in the dark," one that might have eaten up the other shipbuilding programs. Only one, JS *Amatsukaze* (DDG 163), was built, and it took the JMSDF ten years to request a second Tartar DDG.

These were the realities of Japan and the JMSDF around 1960. In retrospect, in those days of the infancy of the force buildup, if the CVH had been approved, whatever its cost, it would certainly have caused serious negative impacts upon almost all sections of the JMSDF. It might have become a hard-to-remove (and self-imposed) obstacle for future force planning. Additionally, if we take into account the performance and quality of helicopters around 1960 and the state of passive acoustic sensors in the JMSDF at that time, it is doubtful if this HUK group could have achieved its mission.

Having said that, however, the point here is that the idea of a CVH, or some form of helicopter carrier, had become a feature of JMSDF force planning and would remain so through the coming decades.

## THE THIRD AND FOURTH DBPS AND THE FIRST STANDARD TACTICAL UNIT

In 1964 the JMSDF started introducing U.S.-developed HSS-2 ASW helicopters. But the operational concept of helicopter force still remained the same—local vital-area defense, conducted from air bases ashore.

It was during its preparatory study for the Third DBP (1967–71) that the MSO concluded that helicopters were indispensable assets for the ASW operations of surface forces. The presumed threat at that time was a conventional submarine (SS) attempting a torpedo attack against a surface force. The threat from the air was, in those early Cold War days, considered to be scattered air raids, mainly free-fall bombing by small numbers of long-range bombers. Of course, SSNs, SSMs, and air-to-surface antiship missiles (ASMs) were examined as well; however, in the mid-1960s, in the northwest Pacific, these threats were estimated to be secondary.

The JMSDF conducted extensive mathematical operations-research analyses of these threat scenarios and came to the following conclusion: a surface force of eight destroyers with six shipboard ASW helicopters would be the most effective against a single SS attempting to make torpedo attacks, supported by sporadic bombing by long-range bombers.

The six ASW helicopters in total—four available for operations at any one time—were to be used as "reaction assets"—that is, to investigate contacts gained or to conduct counterattacks. They were not considered to be primary search assets against the enemy SS. Instead, once contact was gained, the four were to be sent to the contact area to track the submarine and eventually to kill it, when tactical conditions were met.

One issue to be resolved in this concept was how to embark the six helicopters. The JMSDF thought it impracticable to embark the large HSS-2 on board 2,500-ton DDs. The options left were to build either two helicopter-carrying destroyers of seven thousand tons full load (FL), which would carry three helicopters each, or a single, larger DDH, of nine to ten thousand tons, capable of carrying all six. The latter would most likely be a through-deck design, but that was too controversial politically. It was still too early to make a serious argument for a ship that looked something like an attack carrier, even if it was in fact simply an ASW helicopter platform. Thus the decision was made to build two seven-thousand-ton DDHs, conventional destroyers with large hangars for three ASW helicopters, and wide flight decks extending from the midsection to the stern.

On this basis, the JMSDF's antisubmarine warfare concept was reflected in the composition of a new type of "escort flotilla": one DDG, with the Tartar SAM, to be responsible for force air defense; two DDHs, each of 6,500 tons and carrying three ASW helicopters; and five DDs for general operations. Two DDHs were included in each of the next two DBPs, the third and fourth, for a total of four. One of the technical premises for this concept was, needless to say, the successful development and diffusion of Beartrap and of fin stabilizers.

The escort flotilla, whose main mission was ASW, was expected to improve the fleet's antisubmarine capability substantially.[8] Its conceptual composition, as described above, was implemented: the escort flotilla of eight ships and six antisubmarine helicopters became a standard tactical unit for the first time.[9] There had been escort flotillas in the JMSDF before, but those were, in general, the spiritual descendants of the traditional destroyer flotillas of the Imperial Japanese Navy, which had been used as heavy torpedo-assault forces, without aircraft and without a thought-out operational concept.

The first DDH was *Haruna* (see figure 3), commissioned in February 1973; in November 1974, when the second, JS *Hiei* (DDH 142), was commissioned,

**FIGURE 3**


JS *Haruna* (DDH 141)

*Sekai no Kansen*

Escort Division 51 was organized; *Hiei* and *Haruna* joined its Escort Flotilla 1. The third DDH, of a slightly larger (seven-thousand ton) class, was JS *Shirane* (DDH 143), commissioned in March 1980; with the commissioning of the fourth, JS *Kurama* (DDH 144), the next year, Escort Division 52 was formed, and the two *Shirane*-class DDHs were assigned to its Escort Flotilla 2.

So by 1981 the JMSDF had four flotillas, of which two had completed the transition to an eight ships/six helicopters composition. The other two flotillas remained in a premodernized state at that point. One thing to be noted here was the time elapsed from the concept's original development, in 1965, to its realization —it had taken over fifteen years to realize the concept, and then only halfway. This is the reality of the time-consuming nature of naval force building.

## POST-FOURTH DBP AND A NEW CONCEPT

Due to the fourth Middle East war, in October 1973, a quick and substantial jump in the price of crude oil, the "oil shock," hit the world. Its negative effects were felt in almost all sectors of the economy in Japan and led to unprecedented and rapid inflation. Japan's defense industry was no exception, and some disruption, like the cancelations of several shipbuilding contracts for new vessels, was proposed by industry and reluctantly accepted by the government. In this situation, the midterm financial estimate, the basis for next five-year DBP, became unclear. As a result, the government and the JDA gave up formulating a new DBP; instead, three consecutive single-year budgets were adopted. This interval, from JFY 1977 through 1979, where no defense buildup plan was in effect,

was called the "Post–Fourth DBP" (P-4) period. Eventually, and ironically, the P-4 period had a remarkable significance for the JMSDF. In these years, in the middle of the Cold War, the JMSDF developed a new operational concept to meet growing threats. This concept became the centerpiece and theoretical main pillar of JMSDF force planning, and it remains so today, over thirty years later. The new concept was to form large tactical units of eight DDG/DDs and eight antisubmarine helicopters.

During the P-4 period, the MSO recognized the limits of a surface flotilla with eight ships and six ASW helicopters against the Soviet Union's increasing numbers of new-generation SSNs and its growing naval aviation arm. An SS with torpedoes remained a fearsome opponent, but now SSNs with an SSM capability posed a new and serious threat to surface forces. As for the air threat, air-to-surface missile attack had totally replaced conventional bombing. The tactics of air attack had also switched, from scattered bombing to controlled and repeated assaults by waves of ASM-loaded bomber formations, over waters distant from the mainland of the USSR. In general, new intelligence on Soviet naval capabilities changed the threat perception of the JMSDF quickly and substantially. It was full recognition of these changes in the threat that led the MSO to review the existing concept of eight ships with six helicopters.

With regard to ASW, coping with highly maneuverable SSNs, with their great submerged speed and endurance, requires detection, tracking, and attack at longer ranges from surface units. That made the shipboard passive acoustic sensor —the tactical towed-array sonar—essential. Together with TACTASS, the passive sonobuoy was thought to be effective in initial search against SSNs. For this reason, two more helicopters were added to the original six, for reactive operations.

As for AAW, one Tartar DDG was considered insufficient to protect the unit against fierce ASM and SSM attacks, delivered in volume. So the number of DDGs was increased to two, replacing one of the DDHs, and a domestically developed, short-range SAM, which would launch the NATO-developed Sea Sparrow, was to be installed on all the unit's DDHs and DDs for point defense. As a result of this review, a new "eight ships with eight helicopters" initiative was adopted.[10]

There was a further attempt to improve the ASW capability of the JMSDF. It was obvious ASW by surface units, even with helicopters, had limitations, so in addition to the eight ships/eight helicopters concept, the JMSDF decided to obtain a hundred P-3C maritime patrol aircraft. Of these, eighty would be allocated to wide-area surveillance and twenty for direct support to surface units. This integrated antisubmarine warfare posture has been the real force-building rationale of the JMSDF since 1980.

The biggest issue was embarking an ASW helicopter on a four-thousand-ton destroyer; each of the flotilla's five DDs (of a new class, to be designed for the

purpose) would have to carry one. To meet fully the operational requirement of the new concept, each aircraft would need sonobuoy and dipping-sonar systems, as well as MAD. Additionally, a surface surveillance radar would be desirable. However, the small-to-medium-sized helicopters suitable for DDs were limited to the U.S. Navy's SH-2 and the Royal Navy's Lynx, which were both too small and had too little payload. The idea of two different types of helicopters —large and small helicopters, for DDHs and DDs, respectively—was abandoned as operationally inefficient. Only a large helicopter could meet the need, but it had to be small enough to be stored in a hangar and to take off from and land on the flight deck of a four-thousand-ton DD.

After intensive and in-depth research, the MSO concluded that only the HSS-2, which was in current use, could meet these conflicting requirements. But the HSS-2 was equipped only with a dipping-sonar system. At that time, the U.S. Navy had had a similar idea (except for use on carriers) and had started development of a new HSS-2 variant—what would become the SH-3H—but the JMSDF learned of difficulties in that program.

For this reason, the JMSDF decided to install domestically developed equipment on the existing HSS-2. The development effort went well, and a new member of the globally popular HSS-2 family—with a completely different capability, including a surface-search radar in an extendable "radome"—was introduced into the JMSDF, the HSS-2B (see figure 4). Given this success in developing the HSS-2B, the JMSDF was finally able to design and build the new destroyer to handle it, the *Hatsuyuki* (DD 122) class. Eventually the *Hatsuyuki* class paved the way to the realization of the eight ships/eight helicopters concept. The JMSDF now started forming its escort flotillas anew; each would be composed of one DDH with three ASW helicopters, five destroyers with one helicopter each, and two Tartar DDGs.

Since then, destroyer-borne helicopters in the JMSDF have switched to the new-generation SH-60J (1989), followed by the improved and enlarged SH-60K (2003). Equipment has also been improved, together with technology and tactics. For instance, later production models of the SH-60J were equipped with a forward-looking infrared system and a chaff/flare dispenser for self-defense. The SH-60K has a ship-landing guidance system, for operations in poor visibility. Provision is also made for installation of a machine gun and short-range air-to-surface missile. However, their basic operational concept, originating with the HSS-2B, has remained the same. In the same way, more modern and larger destroyers have appeared—*Asagiri* class (4,500 tons, eight ships), the *Murasame* class (6,300 tons, nine ships), then the *Onami* class (6,500 tons, five ships)—but their operational concept is that associated with the first-generation *Hatsuyuki* class.

**FIGURE 4**


HSS-2B with MAD and radome extended

JMSDF

In the eight ships/eight helicopters composition, only one aircraft was embarked on each DD. However, to provide operational flexibility, the enlargement of their hangar bays to accommodate two ASW helicopters (a type known generically as HS) was attempted; the hangar on board JS *Asagiri* was modified during construction. That attempt was not satisfactory; however, in the next class, beginning with JS *Murasame,* provision was made in the design phase to accommodate two SH-60J/Ks at one time. This is officially known as the "one HS embarked and one HS carried" design, and it greatly improved flexibility in missions in the Indian Ocean (supporting ENDURING FREEDOM) and off the coast of Somalia (antipiracy). However, these operations are considered to be variations, adaptations of the fundamental eight ships/eight helicopters concept.

## THE MID-1980S: "AT-SEA AIR-DEFENSE POSTURE STUDY" AND THE DDV

In response to the growing threat posed by Soviet Long-Range Aviation in the late 1970s and 1980s, the JDA in 1986 launched an intra-agency research project called the At-Sea Air-Defense Posture Study.[11] This study, which continued until 1987, was conducted in a period of sharp confrontation between the West and East, the final years of the Cold War. The MSO proposed two systems: the "DDV" (a through-deck carrier for air-interceptor fighters) and an Aegis DDG.

It estimated the Soviet naval-aviation threat as one of concentrated ASM attacks by bombers like the Tu-22M Backfire, in about three groups, each aircraft carrying two AS-4 or AS-6 long-range missiles. The proposed Aegis DDG would be able to shoot down large numbers of incoming ASMs but would be unable to deal with the bombers themselves, attacking from beyond the maximum range of the SM-2 surface-to-air missile of the JMSDF's Aegis system. For this reason, if the tempo of combat increased or the campaign was prolonged or repeated, the bombers would survive and their attacks would continue forever, in theory, while surface units would suffer accumulated losses to missiles "leaking through" in every assault and might ultimately be destroyed completely.

The JMSDF strongly felt the need for an adequate antibomber (that is, anti–ASM platform) asset. One idea was to operate short-takeoff/vertical-landing (STOVL) interceptor fighters from a mother ship, a DDV. That concept envisioned a through-deck ship of fifteen to twenty thousand tons with about ten radar-equipped Sea Harrier all-weather interceptors and about four airborne-early-warning aircraft. However, on New Year's Day in 1988, a sensational article titled "JMSDF to Build Light Aircraft Carrier" was front-paged by nationally circulated newspapers and became somewhat controversial politically.[12]

The MSO turned down the DDV concept due to the negative resonance of the phrase "aircraft carrier" for political and public opinion and within the study panel itself. Then, the senior leaders of the JMSDF decided to focus on the Aegis DDG; after heated discussions about funding, the ship was included in the JFY 1988 budget.[13] The feeling within the MSO was bittersweet: the JMSDF finally obtained the most advanced antiair-warfare ship but had had to trade away, in the DDV, its long-hoped-for air-capable ship.[14]

At least the JMSDF had been able to put a carrier-like combatant—though far different from the once-envisioned ASW helicopter carrier in task and mission—on the agenda again. So this, the second demise of the carrier in the JMSDF, became another important milestone along the road to JS *Hyuga*. The CVH and DDV had been only JMSDF concepts, not government-approved programs, and so had ended as mere dreams. However, it was a stark reality that replacements for the *Haruna*s would have to be laid down in the first decade after 2000, when they would reach the end of their service lives.

## THE *OOSUMI*-CLASS LST: A SIGNPOST TO THE FUTURE

A ship somewhat related to the *Haruna*-class DDH follow-on—known as the Next-Generation DDH, or Next DDH, program—was a new transport ship in the JFY 1993 budget, JS *Oosumi* (LST 4001). *Oosumi* was a fundamental departure from the previous *Miura*-class LST (landing ship, tank).[15] Its operational requirement, which called for a maximum speed of more than twenty knots,

inevitably narrowed its design. The traditional, World War II design based on a bow door and ramp for direct beaching was abandoned, and a narrower, higher-speed hull form was introduced. At the same time, in order to fulfill the basic requirement for beach landing, as military transport, the MSO decided to embark on this ship what was at the time a cutting-edge amphibious vehicle, the U.S. Navy's Landing Craft, Air Cushion (LCAC).

The MSO also looked into the possibility of conducting landing operations by helicopters from this ship. However, there was some tacit resistance within the JDA regarding carrier-like through-deck designs, so the MSO had to be careful on this point. The MSO argued the necessity of a through-deck design for the safety of helicopter operations and efficiency of embarkation and debarkation of troops. After heated discussions within the JDA, the MSO finalized *Oosumi* (see figure 5) as a through-deck transport, designating it as an LST. The JMSDF did not adopt the traditional concept of amphibious assault, in which the ship would operate helicopters in a combat environment. Instead, the JMSDF introduced a substantially different idea, "Maritime Operational Transport."[16] The MSO strongly advocated the through-deck design in support of such a capability. Needless to say, however, the crux of the debate was whether to adopt a

**FIGURE 5**


JS *Oosumi* (LST 4001)

*Sekai no Kansen*

through-deck structure. Ultimately the design was accepted by the JDA and the government of Japan.

All this time, during these heated JDA discussions, there was a strong awareness in the minds of officers in the MSO that the Next DDH project was waiting in the wings.

## THE NEXT-GENERATION DDH

A complicated, two-year-long effort produced a new, five-year Midterm Defense Buildup Plan (the 2001–2005 MTDBP). In it, for 2001, was the Next DDH (see figure 6), a "destroyer with sophisticated command and communication capability, as well as improved helicopters operational capability."[17]

### *Operational Concept*

As one proposed configuration for this vessel, the JDA had released to the mass media a conceptual picture of a ship with a superstructure amidships and a divided forward-and-aft flight deck. This seems to have been done to offset potential public objections rooted in the offensive image of aircraft carriers.[18]

This ship was planned as a replacement for the existing DDHs for the new JMSDF eight ships/eight helicopters concept, based on a threat perception of SSNs/SSs and ASM-equipped bombers. The concept was considered an optimum posture, based on the enormous amount of mathematical operations-research

**FIGURE 6**


Next DDH (conceptual image)

*Sekai no Kansen*

analysis conducted since the Post–Fourth DBP. What the analysts tried to determine was the best composition of a JMSDF flotilla to survive intensive enemy air-to-surface attacks while continuing effective antisubmarine warfare for a certain duration of time.

When the MSO started to develop the operational concept for the Next DDG, the force-planning rationale of ASW as the main mission of the JMSDF was still a given. It followed that SSM-capable submarines and ASM-carrying bombers were (and remain) the most relevant and realistic threats. In other words, the JMSDF thought then, thinks today, and expects to think in the future that the "best" surface force is one that has true capabilities against air-to-surface and surface-to-surface missiles and against submarines.

Here, the importance of continuity of defense concept should be emphasized. The eight-ship/six–ASW helicopter concept of the Third DBP was only partially realized, even fifteen years after its initial development. At that point, only two out of four flotillas conformed to it. This, as noted, reflects the time-consuming nature of assembling a surface force, building at the rate of only one or two vessels per year. Frequent changes of defense or operational concepts would have brought few positive results and caused confusion and ultimately meant failure to achieve force-building objectives. Accordingly, since the Post–Fourth DBP period no fundamental change that could reverse the premises of the estimate has been accepted; the eight ships/eight ASW helicopters concept has been upheld for about thirty years. By 1998, about twenty years after this composition was formulated, all four JMSDF destroyer flotillas were organized in line with it: one DDH, five DDs, two DDGs, with eight HS aircraft. These flotillas, in turn, have been the rationale for modernization. Today the JMSDF has four fully organized flotillas that are probably second in quality only to the U.S. Navy—world-class surface units with the most capable helicopters. This is a result of more than a quarter-century of continuity in defense concept within the JMSDF.

### *A Carrier-like Ship*

In line with that defense concept, the MSO decided that the basic characteristic of the Next DDH, its bottom line, would be an ability to operate three helicopters. However, though it was committed to the eight ships/eight helicopters concept, extensive fleet experience eventually convinced the MSO that even three helicopters would not meet real-world ASW needs.

The operations-research mathematical model used in the development of eight ships/eight helicopters had postulated broad and universal conditions, assuming a simplified scenario of ASW against one submarine (nuclear or conventional) whose presence in an area had been confirmed. The model's output,

then, answered to this specific condition, which had been the basis for the doctrine then existing. The gaps between the force-planning rationale and the reality of widely diverse operational environments and conditions are obvious. The JMSDF has long and wisely exercised flexibility, especially at the fleet level, to bridge this gap.

Commander in Chief, JMSDF Fleet (CinC SDF) normally forms flotillas with compositions most suitable to achieve given missions in given situations. For example, where a flotilla's mission is relatively uncomplicated mission, CinC SDF may allocate fewer ships to its commander—and, of course, the reverse is also true. In the case of a difficult mission requiring larger forces than the standard, CinC SDF may reinforce the flotilla.

Most ordinary training, exercise, and operations are carried out with the normal eight ships/eight helicopters organization. But practical fleet ASW experience has taught an important lesson—that the number of ASW helicopters on a single DDH and in an entire flotilla is insufficient. In a real-world scenario, ships and helicopters may gain several contacts at once and have to categorize each as a submarine or a false detection. Then the real submarines, or most submarine-like contacts, are tracked and identified as friendly or enemy; finally, adversaries are attacked. In short, actual ASW engagements start with large numbers of uncertain contacts, to which the flotilla commander should be able to project helicopters to investigate. In fact, the MSO postulated a simultaneous projection of three or four helicopters for each contact.

Additionally, for other roles, the MSO also decided to add one MCH-101 helicopter, for airborne mine countermeasures and transport. But three ASW helicopters on board the Next DDH was a bottom line; the ship was to represent a concentrated helicopter capability in various tactical ASW situations. Thus, a rationale for the maximum number of aircraft on the Next DDH was developed based on the thinking that as a member of a flotilla of eight ships and eight ASW helicopters, the ship would normally carry three ASW *and* one mine-warfare/transport helicopters—that is, three HS and one MCH. To cope with real-world ASW operations, in fact, the ship might need to embark about ten HS.

All this made it natural and reasonable for the MSO to adopt a carrier-like hull design, with a through flight deck, a starboard island structure, and a large hangar bay under the flight deck. The design accommodated three HS plus one MCH under normal conditions and about ten HS in case of expanded helicopter operations.

However, as Next DDH development continued, another problem arose. In the past, the JMSDF had fielded four antisubmarine helicopter squadrons for shipboard operations—one for each flotilla—and four squadrons for vital/local-area defense from air bases. The shipboard squadrons each had twelve aircraft,

enough to deploy eight to the ships in a flotilla. The land-based HS squadrons were not intended or fully trained for shipboard operations. So there were forty-eight HS helicopters, with about a hundred aircrew teams, available for shipboard operation in all. In order to allow embarkation of as many as ten HS aircraft on the Next DDH, additional HS strength would be necessary.

The MSO decided to make all land-based HS squadrons shipboard capable. Concrete measures were implemented in the JFY 2007 program, as part of a reorganization of the JMSDF decreasing the number of destroyers but increasing the number of helicopters to be embarked on board both DDs and the Next DDH. A gradual transition of land-based squadrons from land to shipboard operation got started. It is now estimated that by around 2015, all HS helicopters in the JMSDF—that is, about eighty aircraft—will become shipboard capable. This number is considered to be right to meet the requirements of maximum shipboard operations in case of necessity.

Another reason as well drove the MSO strongly toward the through-deck design. That was an operational requirement for simultaneous takeoffs by multiple ASW helicopters, preferably at least three. This would solve a limitation of the first-generation DDHs, from which only one helicopter could take off at one time. Thanks to the Beartrap (in later years, the Recovery Assist Securing Traversing, or RAST, system), the time needed for the second aircraft to take off was acceptable, to some extent, but it really took a long time for the third. The problem was the constrained size of the flight deck, which occupied only one-third of the ship's overall length, and the limited number of arresting-traverse systems —that is, two RASTs for three helicopters. The same was also true for landings. The MSO was afraid that this inherent handicap might become a serious problem in a real-world multicontact environment. To the MSO, the best (and only) way to resolve it was to adopt a through-deck design for the Next DDH.

Additionally, the MSO placed emphasis on the importance of an elevator that would lift an SH-60 helicopter with its rotors unfolded and of sufficient height in the hangar to allow rotor-related work on an MH-53E, the largest helicopter in service. The JMSDF especially wanted such an elevator in the Next DDH, because a traditional destroyer-type hangar does not allow repair work on a helicopter whose rotor cannot be folded. The only option in such a case is to send the helicopter to a land base and embark a replacement. This meant not only a temporary decrease in the number of HS on board and in the flotilla, but also, in some cases, a destroyer off its station, while it rushed to a point that placed the air base within the endurance arc of the aircraft. This posed a far greater restriction on force operations than previously thought, and therefore the JMSDF particularly sought a suitable elevator in the Next DDH.

*Command and Control*

The Next DDH was planned not only as one of the eight ships in a flotilla but also as the flotilla commander's flagship. It would need a sophisticated Flag Information Center (FIC) in addition to an ordinary Combat Information Center (CIC). Provisions of various sorts would have to be made to accommodate a larger number of staff officers and enlisted men and women than before, to fully carry out a wide range of missions, from operations other than war to the conventional and fierce combat at sea.[19] The MSO planned to provide optimum space and state-of-the-art equipment and systems for the FIC, taking full account of the lessons learned in the four-ship *Kongo* (DDG 173) and two-ship *Atago* (DDG 177) classes of Aegis DDGs, which were equipped with the first generations of the FIC. The latest improvements were incorporated into the Next DDH.

A new requirement for joint operations also emerged in the planning phase. In 2002 the JDA launched an intra-agency, preparatory study on how to change the JSDF from an independent, service-driven, operational posture to a joint operational one. It was subsequently decided to shift to the new joint posture in March 2006. Since the budget request for the ship was projected for JFY 2005, the JMSDF had to make some provision in its design for joint operations, especially for embarkation of a joint task force (JTF) headquarters, or JTFHQ. It would be inappropriate to have the JTFHQ and FIC in the same compartment, because the JTFHQ would command on a strategic level, while the FIC would mainly focus on tactical command of the flotilla. For this reason the MSO planned a JTFHQ space, separate from the FIC. The MSO designated it as a "multipurpose compartment," envisioning its use also as a command post for both military and civilian elements sectors in humanitarian-assistance and disaster-relief operations, in Japan or abroad. The multipurpose compartments reflected these diverse requirements.

With respect to communications, especially antenna locations, the ship would have a large number of various types of antennas, including for satellite communications and different radiofrequency bands. The MSO sought optimum positions, expecting that the larger size of the Next DDH would ease competition. Placing antennas had been a common problem in destroyer designs.

*Weapons Systems*

JS *Hyuga,* as the first ship of the Next DDH program, employs the FCS-3 (with surveillance and fire-control functions), the Mark 41 Vertical Launching System (VLS), and the Evolved Sea Sparrow Missile as its antiair weapon systems. It has two sets of the 20 mm close-in weapons that are standard on other JMSDF ships. The FCS-3 is a state-of-the-art fire-control system, with four sets of phased-array

multifunction radars. It also has a combat-direction capability to support the ship's CIC and FIC.

Antisubmarine warfare, however, is of course the ship's primary mission. The biggest issue when the eight ships/eight helicopters concept was first discussed was the role of the first-generation DDH in ASW—that is, whether it should devote itself to being a command ship, with its own operational capabilities limited to those of its three helicopters, or should conduct prosecution of contacts along with other ships in the formation. The first-generation DDH was a large ship (seven thousand tons) but retained the general characteristics and capabilities of ordinary destroyers. So this problem was resolved then quite easily. This time the story was a little more complicated. Since the Next DDH was a large, carrier-like combatant (twenty thousand tons), with enhanced helicopter operations capability and improved command functions, its role could be considered to be similar to that of nuclear-powered aircraft carriers (CVNs) of the U.S. Navy.

But the main missions of a U.S. Navy CSG are strike and power projection, not antisubmarine warfare. If a CSG gains an ASW contact, its CVN is supposed to leave the area to continue its mission. Carrier-borne helicopters, destroyers and frigates with antisubmarine helicopters on board, and a supporting SSN may take measures against the contact, but the remainder of the force leaves the area to protect the CVN. In contrast, the main mission of the JMSDF is ASW; when a flotilla gains contact, designated ships, whether DD, DDG, or DDH, rush to the detection site and conduct a prosecution, together with HS assets. Needless to say, no JMSDF unit, including the Next DDH, has the luxury of leaving a contact site to other ships' aircraft. The missions of the Japanese and U.S. forces are completely different. In the most severe case, in fact, a JMSDF flotilla might send two or three groups of destroyers to multiple contacts (two to three ships each), together with their helicopters, and the Next DDH would have to operate alone, or nearly so, in the possible proximity of an enemy submarine.

For this reason, the ASW weapons systems of *Hyuga* are similar to those of a DD. These are a hull-mounted, very-low-frequency sonar (active/passive) as the primary sensor, ASROC (launched vertically in the Mark 41 VLS), two sets of triple torpedo tubes, and countermeasure systems. Of course, its optimum role on a submarine contact spot, in a real operation, would be support of the flotilla commander. In fact, it has been asked since the start of the program, "Is there really a need to install short-range triple torpedo tubes on the Next DDH, which is substantially a light carrier?" But if we compare the mission of a JMSDF flotilla with that of a U.S. Navy CSG, the answer is very clear.

The table gives orders of battle, showing what has changed and not changed in JMSDF ASW flotillas and their destroyers from the days of the original eight ships/six helicopters concept to today.

## JMSDF ESCORT FLOTILLAS

| | **8 Ships/6 HS** | **8 Ships/8 HS** | **8 Ships/8 HS *(Hyuga)*** |
|---|---|---|---|
| DDH | 2 ships (3 HS each)<br>5-inch guns<br>active hull sonar<br>ASROC/TT<br>32 knots | 1 ship (3 HS)<br>5-inch guns/CIWSs<br>Sea Sparrow SAM<br>active hull sonar<br>SDPS<br>ASROC/TT<br>32 knots | 1 ship [3 HS + 1 MCH + (10)]<br>JTFHQ compartment<br>Flag Information Center<br>through flight deck<br>CIWSs<br>ESSM (V)<br>active/passive hull sonar<br>SDPS<br>ASROC (V)/TT<br>30 knots |
| DD | 5 ships (2 types, no HS)<br>3-inch guns/5-inch guns<br>active hull sonar<br>ASROC/TT<br>27 knots/32 knots | 5 ships (1 HS)<br>3-inch guns<br>CIWSs<br>Sea Sparrow SAM<br>Harpoon SSM<br>active hull sonar<br>TACTASS/SDPS<br>ASROC/TT<br>30 knots | 5 ships [1 HS + (1)]<br>3-inch guns/5-inch guns<br>CIWSs<br>Sea Sparrow (V)/ESSM (V)<br>Harpoon/SSM-1<br>active hull sonar<br>TACTASS/SDPS<br>ASROC (V)/TT<br>30 knots |
| DDG | 1 ship<br>3- or 5-inch guns<br>Tartar (SM-1) System<br>active hull sonar<br>ASROC/TT<br>32 knots | 2 ships<br>5-inch guns<br>CIWSs<br>Tartar (SM-1)<br>Harpoon SSM<br>active hull sonar<br>ASROC/TT<br>32 knots | 2 ships<br>Flag Information Center<br>5-inch guns<br>CIWSs<br>Aegis (SM-2)<br>Harpoon/SSM-1<br>active hull sonar<br>TACTASS/SDPS<br>ASROC (V)/TT<br>30 knots |
| HS | ASW: active dipping sonar<br>torpedo<br>SAR<br>transport | ASW: active dipping sonar<br>sonobuoy<br>radar/ESM<br>MAD<br>torpedo<br>ASST: radar<br>SAR<br>transport | ASW: active dipping sonar<br>sonobuoy<br>radar/ESM<br>MAD<br>torpedo<br>ASST: radar/ESM<br>ASUW: Hellfire ASM<br>30 cal. machine gun<br>Self-protection: chaff/flares<br>SAR<br>transport |
| | 2 of 4 flotillas completed | All 4 flotillas completed | All 4 flotillas to be completed |

*Key:* ASST: antisurface surveillance and targeting; ASUW: antisurface warfare; CIWS: Close-In Weapon System; ESM: electronic support measure; ESSM: Evolved Sea Sparrow Missile; SAR: search and rescue; SDPS: sonobuoy data processing system; SSM-1: domestically developed SSM; TT: torpedo tube; (V): vertical launch.

*Note:* As of December 2010 there were six Aegis DDGs and two Tartar DDGs in the JMSDF Fleet. Expected remaining service life of the two relatively young Tartar DDGs is about 10 more years. So it is right to estimate that the DDG force of the JMSDF will remain the same until the early 2020s.

### ISSUES TO SOLVE

When planning the Next DDH, now *Hyuga*, the MSO had studied various options, such as a deck-edge elevator, a port-side exhaust for the port gas-turbine

power plant, and airflow deflectors on the flight deck. Give the limitations of cost and size, the MSO came to the conclusion that the current configuration of *Hyuga* was the best. However, the following issues remain for the future.

***Multiple Functions.*** One of the important characteristics of JS *Hyuga* is its multipurpose command functions—for JTF command and humanitarian-assistance/disaster-relief coordination, as well as ASW flotilla operations. Since before its commissioning, some publications in Japan have emphasized *Hyuga*'s potential goodwill function. In fact, however, the ship's "multipurpose" characteristics, which were added onto its original maritime combat capability, refer to its adaptability as a large, carrier-like combatant for a variety of situations. For instance, it is reported that the JSDF Joint Staff Office and other services of the JSDF have requested that additional accommodation for combat vehicles and troops be built in.

In general, the *Hyuga*-class ship is large enough to accomplish most new tasks that are proposed, even now that its specifications have been determined. However, from a force-planning and operational-requirement viewpoint, precise consideration should be given. *Hyuga* is built as part of the eight ships/eight helicopters concept; its fundamental requirement should be developed under that framework—its capabilities as a flotilla flagship, as a platform for extensive ASW helicopter operations, and as an ordinary combatant capable of ASW and self-defense AAW. New tasks proposed by other services that tend to change the *Hyuga*-class DDH from a combat-oriented destroyer variant to a primarily multipurpose ship, that could trade its original war-fighting capabilities for others, should be carefully examined and if necessary declined. An appropriate balance is necessary.

***An Aircraft Carrier?*** Some say: "If the JASDF employs F-35B [the STOVL version of the Lockheed Martin Lightning II, formerly the Joint Strike Fighter] fighters in the future, *Hyuga* and its sisters should operate them and so achieve any capability as a STOVL aircraft carrier, or 'STOVL-CVX.'" That would be justifiably supported in terms of full exploitation of resources on hand. It is natural for any armed force to plan for the maximal use of its existing systems—in this case, STOVL fighters and through-deck HS carriers that are large enough to operate them. This is the true charm of military planning and execution. In any case, such flexibility is necessary for joint missions. If a military organization cannot so operate when necessary, it cannot be said to possess military expertise. Service personnel cannot and should not say no to a mission that is given them—they have to carry it out, fully utilizing all assets currently available.

Having said that, however, it was quite uncertain whether the JASDF would introduce the F-35B at all. As of December 2010, the JASDF has only made requests

to the United States and other nations in the joint development group for release of F-35 information necessary for future decisions on next-generation fighters. So, it is fair to say that though JASDF would most likely try to introduce the conventional F-35A for its own mission, it still is unclear whether it and the government will ultimately decide to do that. So the dream of JASDF F-35Bs on the Next DDH remains an improbable one.

And after all, *Hyuga* is primarily an antisubmarine combatant, planned under the eight ships/eight ASW helicopters concept. It is essentially different from an aircraft carrier built for strike or air defense. In the future, should Japan, in a changed security environment, need a (light) aircraft carrier within the scope of the nation's constitution, it should build one. Even then, the government and the JMSDF would be obligated to explain thoroughly its necessity to the Japanese people, to gain their full consensus and support. In terms of healthy civilian control, the introduction of a new system or ship of such significance as a (light) aircraft carrier should be accompanied by thorough and public discussion.

***Terminology.*** Recently, an old, and yet new, naval term, *hachi-hachi kantai* (eight/eight fleet), has been widely spreading within the JMSDF and the Japanese media.

The ostensible reason seems to be simply that *hachi* in Japanese means "eight." But this phrase designated a force-planning concept of the Imperial Japanese Navy in the 1910s—the days of sixteen-inch guns, such as those on the battleship *Nagato* and carrier (converted battle cruiser) *Akagi*.[20] This was a period of tonnage and gun-caliber arms races among the major naval powers. This eight/eight fleet concept was to build up a formation of eight battleships and eight battle cruisers as a core of the Combined Fleet. Eventually, the plan was abandoned under the terms of the Washington Naval Treaty of 1922.

But today's basic tactical unit of the JMSDF, while superficially similar in the numbers involved, is based on the JMSDF's operational concept and so is completely different from *hachi-hachi kantai* posture of the Imperial Japanese Navy. Thus the term *hachi-kan hachi-ki taisei*—eight ships/eight helicopters posture—should be used instead. When the author served at sea in the early days of this posture—as a combat systems officer on board a brand-new *Hatsuyuki*-class DD (1984–86, as a lieutenant commander) and commanding officer of a ship of the class (as a commander, 1990–91)—the expression *hachi-hachi kantai* was strictly prohibited in the JMSDF—as was thought required by a proper understanding of, and respect for, the naval history of Japan.

## AN INDISPENSABLE ELEMENT OF SECURITY

The road to *Hyuga* originated in the CVH concept immediately after the foundation of the JMSDF in 1954. It passed the milestone of the first-generation

DDH, then the DDV of the At-Sea Air Defense Posture Study, and the efforts that followed. Finally, fifty-seven years after the foundation of the Japan Maritime Guard, *Hyuga* was realized as a carrier-like helicopter destroyer. Since its commissioning, expectations for *Hyuga* have been increasing inside and outside of the JMSDF. Also, criticism of Japan's possession of an "aircraft carrier" has been made by several surrounding nations. Yes, it is true that this ship has a through-deck and is the largest combatant in the JMSDF's history, but it still is a helicopter destroyer, planned and built under the long-standing operational concept of the JMSDF, and it is not almighty. *Hyuga* is not, for reasons described in this article, a carrier in a traditional sense.

Also, the seemingly stubborn, even inflexible, nature of force building in the JMSDF might be questioned. Is the ASW-oriented rationale that the JMSDF has so long maintained still good enough? Does it meet today's complicated security environment and its diverse and challenging missions? My answer is yes. Except for power projection and strike, which require specialized assets (such as U.S. Navy–style CSGs or amphibious forces), antisubmarine warfare is the most sophisticated and difficult kind of maritime operation. Any navy or maritime force capable of ASW as its primary mission is necessarily able to carry out other missions as well, ranging from traditional at-sea combat to counterpiracy or humanitarian assistance and disaster relief. In other words, a naval force built upon high-end concepts can manage a wider range of missions than can one built upon low-end doctrine. In practice, the JMSDF is able to deal with almost all of the maritime missions, threats, and warfare areas that have emerged during the last two decades. The JMSDF has augmented its capabilities with various new disciplines, such as special operations, cyber warfare, and ballistic-missile defense, beyond the scope of antisubmarine warfare alone.

Over and above all this, the strategic concept of the JMSDF is to maintain a complementary relationship with U.S. naval forces. The current nature of regional submarine forces makes ASW still vital to the security and safety of U.S. naval forces in the area. Even with continuous and uninterrupted effort—operating on a "24/7" basis, in war, contingency, crisis, or peace—we can barely manage to maintain a favorable ASW environment. There is no specific remedy for the submarine threat. As an ally and partner of the United States and its navy, the JMSDF bears a heavy burden in this task, which has been an indispensable element of security of the region and will remain so in the future.

It is important to remember that a characteristic of maritime operations is flexibility. The JMSDF, like many other navies, can organize any type of force for any given mission by combining ships of the most appropriate types. A JMSDF force composed of some optimal combination of ships—perhaps *Hyuga,* the Aegis DDG, other destroyers, an *Oosumi*-class LST, or a *Mashyu*-class fast combat support

ship—could complete almost any possible mission in any waters on the planet. In *Hyuga* and its sisters the JMSDF has a world-class capability. The key for the future is to make this type truly capable, and to establish an optimal operational posture.

The flood of construction of carrier-like multipurpose ships, like JS *Hyuga,* in the world's navies may cause concern about a new "carrier arms race." However, as we have seen, each navy must formulate, like the Japan Maritime Self-Defense Force, its own strategy and force-planning rationale for this type of ship, taking account of contemporary security circumstances and the tendency toward expanded naval missions. Through-deck multirole ships—not the strike-oriented carriers of several navies—are the most suitable for deepening international coordination and collaboration among navies.

## NOTES

This article represents the personal opinions of the author and not any official position of the JMSDF or the government of Japan. The author expresses special appreciation to Mr. John Niemeyer, a special adviser to the Commander, U.S. Naval Forces Japan, for substantial contributions to the English text of this article.

1. The Japan Maritime Guard (JMG) was established in the Japan Coast Guard on 26 April 1952. On 1 July 1954, the JMSDF was inaugurated within the Japan Defense Agency, together with the ground and air self-defense forces. *Boei Hakushyo* [Defense Whitepaper: Defense of Japan], English-language version (Tokyo: Ministry of Defense of Japan, 2008), pp. 542–43.

2. The new constitution of Japan, which replaced the Meiji constitution, came into effect on 3 May 1947 in occupied Japan. Article 9 prohibits Japan from having armed forces: "Aspiring sincerely to an international peace based on justice and order, the Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as means of settling international disputes.

   "In order to accomplish the aim of the preceding paragraph, land, sea and air forces, as well as other war potential, will never be maintained. The right of belligerency of the state will not be recognized." Available at www.kantei.go.jp/.

   The government's interpretation of article 9 is that the constitution bans "wars of aggression," not "wars of self-defense." Accordingly, the JSDF—designed to act only in the defense of the nation if it is attacked—is purely a constitutional entity; collective view of the Hatoyama cabinet, submitted 22 December 1954, reprinted in *Boei Handbook of 2009* [Handbook for Defense 2009] (Tokyo: Asagumo Shinbunshya, 2009), chap. 12, "Position of Government of Japan on Defense of Japan," p. 604.

3. Ibid., "MTDBP (2001–2005)," document I-1-(4), p. 17.

4. Ibid., pp. 19–50.

5. *Canadian Navy,* www.navy.forces.gc.ca/.

6. The first assignment of the author as a newly commissioned ensign in the JMSDF in 1973 was as main propulsion assistant on board JS *Mochizuki* (DDA 166), which carried two DASH aircraft. One of the ship's DASH officers called himself an "ace" because he crashed three of them in accidents during his tour (apparently considering three friendly drones in exercises equivalent to the five enemy aircraft destroyed in combat traditionally required for that honorific). This gives a good indication of the poor reliability of the system in those days.

7. Hiroshi Nagata, "Kaijojieitai DDH unyokoso no hensen" [History of the DDH Operational Concept in the JMSDF], in *Sekai no Kansen*

[Ships of the World] (Tokyo: Kaijin-shya, July 2001), pp. 69–71.

8. Ibid., pp. 71–72.

9. See Yoji Koda, "Jieikan no Genyu Seiryoku to Shyorai Tenbo" [The Present and Future of JMSDF Ships], in *Sekai no Kansen* (January 2009), p. 125.

10. Ibid., pp. 125–26.

11. *Boei Hakushyo* [Defense Whitepaper: Defense of Japan] (Tokyo: Ministry of Defense, 1987), p. 193.

12. *Yomiuri Shinbun,* 3 January 1988.

13. The *Asagiri*-class DD (JFY 1985) cost 43 billion yen, the newest Tartar DDG (in 1983) about 69 billion yen. In comparison, the cost of the first Aegis DDG, when requested in JFY 1988, was estimated to be 122 billion yen, 2.8 times that of a conventional destroyer and 1.8 times that of a Tartar DDG—a very expensive project for Japan and the JMSDF.

14. When the JFY 1988 budget was passed by the Diet, a captain responsible for plans, policy, and programs within the JMSDF said (the author, then a commander and an action officer in the Aegis DDG program, recalls this remark as if it were yesterday), "This does not mean our loss. It is our great victory to have been able to secure budget for a first Aegis DDG. The next chance will surely come fifteen years from now when JMSDF will replace our first DDH *Haruna.* A lot will be expected of younger generations who are now from lieutenant to captain."

15. The LSTs of the *Miura* class (2,500 tons fully loaded, three ships) and the smaller *Atsumi* class (1,800 tons, three ships) were designed to a World War II concept and were built in Japan. Their main characteristic was their ability to beach. This capability facilitated loading and unloading of vehicles and personnel, at the cost of extremely slow speed. These ships' design maximum speed was fourteen knots; however, their cruising speed was actually about ten knots, due to their flat bottoms. JMSDF LSTs are officially designated "transport ships."

16. See Koda, "Present and Future of JMSDF Ships," p. 129. The concept of Maritime Operational Transport is to deliver JGSDF reinforcement units to an area where an enemy landing is possible or probable, or where an enemy has already landed but that is still under Japanese control. The point is that the landings would be on Japanese territory, not foreign soil. So, in theory, this concept does not involve amphibious assault. The tempo of helicopter transport and the types of helicopters required would be very different from those in an assault amphibious landing.

17. *Boei Handbook of 2009,* p. 128.

18. The author was director general of the Operations and Plans Department in the MSO (having been assigned in January 2001, only a month after the MTDBP was approved). The cabinet decision had fixed only characteristics and numbers, not the ship's design—the through-deck was just one of the JDA's ideas. The government, the JDA, and the MSO agreed that the design would be decided only later, at the time of the budget request. "This irks me!" I told myself; "By all means we will realize the through-deck ship, which has been the long lasting goal of the JMSDF."

19. The authorized personnel strength of flotilla headquarters was calculated on the basis of flotilla operations as a training force in peacetime. In particular, the number of flag watch-standers needed for long-term operations was not considered—only that required for exercises and training evolutions of limited duration. This reality reflected the position and policy of the government until the end of the Cold War—that is, not to deploy the JSDF on any real-world missions other than responses to direct aggression against Japan. With the end of the Cold War, the government reviewed its policy and started deploying forces on various international missions. Even so, due to shrinking budgets and a difficult recruiting environment, only slight increases in flotilla staffs could be managed. To address this gap, the JMSDF decided to form mission-oriented headquarters for each real-world deployment, such as support operations in the northern Indian Ocean/Arabian Gulf and antipiracy off the coast of Somalia. Extra staff members would be added, depending on the given task. Nonetheless, the above-mentioned deployments involved only one or two destroyers and an oiler; the Combat Information Center of a destroyer is adequate for the commander of a force that size. Next DDH is the first ship to

have a "king size" FIC for full-scale flotilla operations.

20. For a widely read Western account, see David C. Evans and Mark R. Peattie, *Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887–1941* (Annapolis, Md.: Naval Institute Press, 1997), esp. chap. 6.

# THE GREAT GREEN FLEET

## The U.S. Navy and Fossil-Fuel Alternatives

*Lieutenant Alaina M. Chambers, U.S. Navy, and Steve A. Yetiv*

On 16 December 1907 President Teddy Roosevelt launched the deployment of sixteen brand-new, glistening white, steam-powered battleships on a fourteen-month circumnavigation of the globe.[1] Later known as the "Great White Fleet," the armada demonstrated America's new ability to project its power abroad and represented a turning point in global power politics. The cruise is still widely recognized as an important achievement for the U.S. Navy. In the century since then, in which the United States has emerged as the world's sole superpower, its navy has made some strides in transforming itself for the purpose of dealing with new and emerging global threats. It continues to face such challenges, and it remains to be seen how effective it will be with its ongoing transformation.

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*Naval War College Review, Summer 2011, Vol. 64, No. 3*

The complexities of projecting American power abroad have been compounded by an array of costs that are increasingly associated with the use of fossil fuels. The American public and peoples around the world are gradually recognizing that oil dependence is a major problem and that it is crucial to develop a serious, long-term approach for dealing with it. The key concerns related to oil use are now commonly expressed —among them, that American oil dependence enriches and empowers some of its adversaries, including terrorists who use oil-related monies and states, such as Iran, that fund their defense programs with oil money;[2] that reliance upon oil makes the United

States vulnerable to the vagaries of Middle East politics; and that oil consumption contributes fundamentally to climate change.[3] The use of alternative energies would also pose costs, but not the full array of these costs.

The American government as a whole and specifically the Department of Defense increasingly view fossil-fuel dependence as a national and international security vulnerability. Their concerns not only revolve around the obvious issues of the costs of transportation and the protection of oil resources and infrastructure but extend to broader problems as well.[4] Thus, in 2007 the CNA Military Advisory Board, made up of retired admirals and generals from across the military services, issued a report that defined climate change as a key threat to national security and world stability, a matter that required immediate attention.[5] Expressing frustration with public reluctance to accept scientific findings on climate change, a former Army Chief of Staff, General Gordon R. Sullivan, addresses a core aspect of military decision making: "We never have 100 percent certainty. . . . If you wait until you have 100 percent certainty, something bad is going to happen on the battlefield. That's something we know. You have to act with incomplete information. You have to act based on the trend line. You have to act based on your intuition sometimes."[6]

From a different perspective, the U.S. Joint Forces Command's *Joint Operating Environment, 2010* describes various threats posed by developing countries like China, which is racing to acquire oil resources around the world as its demand for oil rockets.[7] The document, which speculates on global trends that could impact future joint military forces, addresses significant concerns about the destabilizing effects of American oil dependence. After all, future violent conflicts and humanitarian disasters will be directly in the purview of the U.S. military, whether caused by the stresses of climate change or an "arms race" over natural resources.[8]

Meanwhile, the Pentagon is struggling to identify the true cost of its 300,000 barrel-per-day consumption, factoring in the logistical costs of supplying deployed units in Iraq, Afghanistan, and elsewhere.[9] Estimates range from a hundred to six hundred dollars per gallon, depending on whether the fuel is transported in peaceful or hostile areas and by truck, aircraft, or helicopter.[10] Delivery to a ship at sea can cost from five to fifty times the market price.[11] The cost of transporting fuel in convoys to remote forward operating bases in hostile-fire zones includes the loss of lives to roadside bombs or enemy attacks. Would transporting alternative liquid fuels present similar logistical challenges? At least one difference is that where electricity can replace fossil-fuel use through innovative technologies (for example, in electric vehicles), it can be delivered in safer ways and even be generated closer to the area of need. In any case, determining the "fully burdened cost of oil," though not a hard science, takes into

account all of these realities and is a fundamental force behind the military's push for alternative energy.

Though its 300,000 barrels per day represents less than 2 percent of total American oil consumption, the Defense Department is the single largest consumer in the country.[12] Of the services, at least 25 percent is allocated to the Navy, the second-largest service consumer.[13] The Army and Air Force have their own "green" energy initiatives, but this article focuses on the Navy's diverse and important measures to tackle the problem of fossil-fuel dependence. Secretary of the Navy Ray Mabus's October 2009 energy vision addresses the Navy's mission areas at sea, ashore, and in the air. In the transformative spirit of the Great White Fleet, it envisions a "Great Green Fleet," made up of nuclear carriers, hybrid electric biofueled surface ships, and biofueled aircraft, supported by shore-based installations that run largely off renewable electricity.[14] In spite of budget efficiency reviews and realignments in 2010, the Navy is pressing ahead with energy projects.

This article makes two basic arguments. First, the U.S. Navy is engaged in what appears to be a serious move away from oil dependence. The American military is not generally viewed as a bastion of environmentally conscious innovation —quite the contrary. The popular idea is that the military tends to be conservative and not progressive; for their part, specialists in national security and world affairs tend not to think of the U.S. Navy as seeking novel ways to decrease oil dependence. They are more likely to view it as expending oil copiously and without great concern for the implications of doing so.

In fact, however, like some other sectors of the military, the Navy is transforming itself in an attempt to break away from the conventional, fossil fuel–driven energy market. Its developments in this arena should challenge perceptions of the military as conservative and behind the times. Secretary Mabus freely acknowledges that the politically controversial topics of climate change, "peak oil" (projections of when global petroleum extraction will reach a maximum and begin an inevitable decline), and green investment are the driving forces behind his strategic plan. He and other Defense leaders have expressed deep concern over the implications that reliance on fossil fuels could have on national security. The 2010 Quadrennial Defense Review declares, "Climate change, energy security, and economic stability are inextricably linked."[15] The report stresses that the effects of climate change are already being felt and that they demand proactive engagement and collaboration.[16] Among other effects, rising sea levels, intensifying weather patterns, and the shrinking of arctic ice caps all potentially affect the operating patterns of Navy maritime and expeditionary forces.

Second, this article makes the argument that the Navy's approach to the question of oil dependence merits attention. The U.S. government as a whole, as well as international governments and companies, should be interested in the Navy's approaches, and increased cooperation among these actors would make eminent sense.

## THE MABUS VISION

As we will see, the U.S. military has over decades taken steps to cut its dependence on foreign oil and move toward cleaner technology, but the low cost of oil has heretofore limited incentives for doing so in a consistent and sustained manner. However, the high oil prices of 2008, which reached around $147 per barrel, spurred greater interest in this regard, as did the election of President Barack Obama, who has put energy and the creation of "green jobs" at the top of his agenda.[17] His Secretary of the Navy, the Honorable Ray Mabus, assuming the role in June 2009, immediately accelerated the service's shift to alternative energy. The Navy's plan is highly ambitious.

The Navy appears to be moving in the right direction so far. In October 2009, USS *Makin Island* (LHD 8), aptly nicknamed the "Prius of the Seas," was commissioned as the first amphibious assault ship equipped with gas-turbine engines and all-electric auxiliary machinery.[18] On 22 April 2010, Earth Day, the Navy publicly demonstrated a test "Green Hornet" variant of its most capable fighter jet, the F/A-18 Super Hornet, powered by a fifty/fifty blend of biofuel and conventional jet fuel.[19] These technologies had been in development before Secretary Mabus's appointment, but they represented major steps toward his goals.

Secretary Mabus's naval energy plan comprises five key targets to be reached in the next decade. First, half of all Department of the Navy (DoN) energy consumption ashore and afloat is to come from alternative sources by 2020. Second, by 2020 half of all naval installations are to be "net zero" energy consumers, producing electricity from renewable sources, such as solar, wind, ocean, and geothermal power, even supplying excess energy to the civilian grid. Third, by 2012 the Navy is to have developed a "green" strike group, made up of nuclear-powered carriers, hybrid-electric-driven surface ships (their oil supplemented by biofuel), and biofuel aircraft. By 2016, the force will begin an out-of-area deployment as the first strike group of a future "green fleet." Fourth, by 2015 the Navy is to cut by half the use of petroleum in its fifty-thousand-vehicle fleet of cars, trucks, etc., by incorporating hybrid and electric vehicles.

Finally, the Navy is reforming its acquisition process. This initiative, which addresses the Navy's challenge of rising contracting costs generally, is to incorporate the lifetime cost of fuel in the consideration of new contracts.[20] The acquisition process underwent intense scrutiny in 2010, especially the shipbuilding

programs. While the fiscal year 2011 Defense Department budget increased, some high-profile programs were cut due to increasing costs, including the projected next class of guided-missile destroyers, the DDG-1000.[21] The Defense Department is now thoroughly reviewing budget efficiency and reallocating money away from certain costly programs. Nonetheless, energy security and climate change remain key priorities. According to Secretary Mabus, the DDG-1000's hybrid-electric propulsion system will be backfitted into the existing *Arleigh Burke* (DDG 51) class.[22]

Though some may question whether the acquisition-reform initiative could damage its predictability as a customer, the Navy will still be attractive to potential contractors. Its current budget allots about $200 million to energy projects and research and development.[23] Secretary Mabus has stated that DoN has "4.4 million acres of land, 72,500 buildings, 50,000 commercial vehicles, 3,800 aircraft, 286 ships, and more than 900,000 employees."[24] Each ship requires about ninety thousand barrels of fuel annually.

The required technology for becoming less dependent on oil exists but is not fully developed. Some of this technology is designed for increasing the ability of electricity to offset the use of fossil fuels, which, at present, is not significant. Increasing this ability translates chiefly into replacing oil with electricity where most of the world's oil is used—in transportation. Moving to a fleet of electric and hybrid vehicles could accomplish this goal.

Also, if history is any indication, the "technological curve" should produce higher-quality, lower-cost technologies over time. That has certainly been the case with semiconductor-based consumer products and with internet routers and switches. That is important because as long as oil remains relatively cheap, such technologies may not be feasible to pursue without government subsidies or market "triggers," such as higher taxes on fossil fuels. This is where a customer like DoN could play a role, serving as a predictable customer of green technologies, with a long-term demand.[25] Even a comparatively small amount of money could help stimulate a growing industry, especially with other branches of the military following suit. Gradually larger military orders could drive innovation and foster economies of scale. Once capable of filling bulk orders at competitive cost, these burgeoning industries would be in a position to bid for private-sector fuel contracts.

The Defense Energy Support Center (DESC) is the organization responsible for acquiring and providing various types of fuel to the services, at standard prices intended to provide some degree of protection against wild swings in the market.[26] The standard price, however, is subject to some fluctuation; from 2004 to 2005, it was adjusted ten times.[27] In fiscal year 2008, when oil hit $147 per barrel, the Navy and Marine Corps consumed about 38.5 million barrels, with 38

percent going to aviation, 25.5 percent to maritime forces, 31 percent to expeditionary forces, and 5.5 percent to shore-based services.[28] DoN's fuel cost increased from $1.2 billion to five billion per year, in one year.[29] With further instability in global oil markets looming, the pursuit of alternatives grows more imperative for the Navy.

## REVOLUTIONIZING ENERGY TECHNOLOGY TO POWER TACTICAL VEHICLES

"Tactical vehicles" are air, land, and sea-based "vehicles"—including, that is, aircraft, ships, and craft—that directly conduct or support military operations. They represent the overwhelming majority of Navy and Marine Corps fuel consumption and present special challenges in terms of finding reliable alternative fuels. Biofuels represent one of DoN's most promising sources, but with current technology they require extensive land and water resources to produce. For this reason, Secretary Mabus is adamant that DoN sources of biofuel are not to compete with food crops, as has corn-based ethanol. This policy puts the Navy on stronger political footing in developing biofuels.

Naval assets rely heavily on three types of fuel oil: JP-8 jet fuel, for shore-based aircraft; JP-5, which has a higher flash point, for carrier-based aircraft; and F-76, a maritime distillate fuel oil, for ships. Contracts have been let to pursue camelina, a weedlike plant related to mustard, as an alternative to JP-5.[30] Algae-based fuels have proved promising as alternatives to JP-8 and, especially, F-76.[31]

Unlike oxygenated fuels like ethanol, vegetable-based fuels, such as those derived from camelina, behave exactly like traditional jet fuel but cut "cradle to grave" carbon emissions by 84 percent.[32] The Green Hornet test flight on Earth Day in 2010, burning a fifty/fifty mix of vegetable-based and traditional fuel, demonstrated how far the technology has come—the Hornet "hardly knew the difference."[33] Camelina-based fuel now costs about sixty-seven dollars per gallon, but with enough demand the cost could eventually be comparable to that of fossil fuel.[34] In 2009 DESC awarded the Sustainable Oils Company a $2.7 million contract for forty thousand gallons, with the option to acquire an additional 150,000.[35] This is a small amount of the Navy's overall oil consumption but a huge production goal for the infant industry. Camelina requires a fraction of the water and fertilizer needed by other crops. It can be grown in marginal lands or produced as a rotation crop with wheat, to prevent overexpansion of cultivated land.[36]

Navy contracts are being extended for algae-based biofuel as well. While camelina has been more rapidly deployed, algae could be an able competitor. Through a contract with Solazyme, in southern California, the Navy will allocate $8.5 million toward 1,500 gallons for aircraft testing and twenty thousand for

maritime use, significantly more money per gallon than it will spend on the camelina option.[37] DoN accepted a delivery of twenty thousand gallons from Solazyme in 2010 and extended a new order for 150,000 gallons.[38] Like camelina, algae do not compete with traditional food crops. Algae can be grown on brackish, saltwater, or nonarable desert land, reducing the need to divert freshwater.[39]

A skeptic might point to the sheer scale of the Navy's biofuel goals. In order to supply the Navy's entire current demand for aviation fuel with algae, an estimated five hundred square miles of land would be required to grow the plants. To bring the cost down to two dollars a gallon, carbon dioxide would have to be transported from nearby conventional power plants;[40] otherwise the cost jumps to forty-four dollars.[41] Similarly, without a program to manage land and infrastructure for biofuels, camelina grown in the amounts necessary to meet DoN demand would require an area equivalent to between a quarter and a third of the state of Montana.[42] At present, these obstacles are prohibitive, as they are for other forms of green energy. However, they could be surmounted as technology progresses and economies of scale emerge. Advances, for instance, in battery technology have allowed for a variety of electric and hybrid vehicles to gain traction in the market—a development that would not have been possible a decade ago.

The Department of the Navy is not alone in its attempts to develop and test algae- and camelina-based fuels and bring down the costs of production. As jet fuel accounts for half of the Defense Department's fuel consumption, the Air Force is testing similar technology to develop a JP-8 equivalent.[43] Both services could benefit from the other's success, as could the aviation industry. Additionally, the Defense Advanced Research Projects Agency has awarded a $34.8 million contract to two companies to find ways to reduce the cost of algae-based fuel to three dollars per gallon.[44] This effort has been met with skepticism, but the agency's methods have proved successful in the past—notably with the computer mouse, the Global Positioning System, and the internet.[45]

Biofuel development, however, is only a part of the Navy's strategy to transform its tactical vehicle fuel consumption; new technology for the weapons systems themselves represents another initiative. *Makin Island* is the first amphibious assault ship to employ more efficient gas turbines instead of the traditional steam boilers.[46] Additionally, it can shift to full-electric propulsion at low speeds, perhaps up to 75 percent of the time it is under way.[47] The new, comprehensive machinery-control system also allows the ship to switch readily between gas-turbine and auxiliary power.[48] While it still must burn fuel to generate electricity, the ship represents a leap forward in efficiency and fuel consumption in comparison to its predecessors in the *Wasp* (LHD 1) class.

Among U.S. warships, the *Wasp*s are second in size only to nuclear aircraft carriers and provide a vital capability to transport Marines, equipment, and aircraft and send them ashore. They are tremendously capable platforms and workhorses in today's global environment, which increasingly presents needs for littoral capabilities, from disaster relief to command and control for forces ashore. With growing missions and deployments comes concern over cost. On its first voyage, from the outfitting yard in Mississippi to its home port in San Diego, *Makin Island* saved nearly two million dollars in fuel costs.[49] If fuel prices remained constant, the ship could save $250 million over its lifetime.[50] Here is a potential for tremendous fuel savings, especially as the technology proliferates —to, for instance, USS *America* (LHA 6), the first of a new class of slightly smaller but similarly equipped amphibious assault ships.[51]

As mentioned above, hybrid electric drive is being developed for incorporation into new and existing *Arleigh Burke* guided-missile destroyers. These Aegis-fitted ships are also fleet workhorses and thus present real opportunities for fuel-cost savings; refitting the older units with these more efficient engines is expected to save 8,500 barrels per ship per year. However, the technology still has a long way to go.[52] The contract must be finalized with General Atomics before the prototype propulsion system is expected in 2012 and a full production unit is installed in an *Arleigh Burke* to be launched in 2014, in time to meet the green-strike-group goal of 2016.[53]

Another important energy alternative is nuclear power, which the Navy already successfully employs in the eleven aircraft carriers and seventy-seven submarines (at this writing) of its 286-ship fleet.[54] The department assesses that 16 percent of its energy use is supplied by nuclear fuel.[55] The nuclear navy represents the core of the Navy's strategic power projection capability. For over fifty-five years, DoN has maintained an excellent safety record through its high standardization and quality education and training.[56]

The expansion of nuclear propulsion into other naval platforms has also been considered. For instance, it was recommended for the "Next Generation Cruiser," or CG(X), program as a way of offsetting the ship's immense procurement costs while meeting the demands of its advanced systems.[57] Retrofiting of large-deck amphibious ships with nuclear energy has also been suggested.[58] If oil prices remain above eighty dollars per barrel, the improvements would pay for themselves over the life of the ship.[59] Nuclear technology, however, is still extremely expensive. The CG(X) program was cut from the proposed fiscal year 2011 budget as too costly.[60] Further, the high cost of manpower must be accounted for in nuclear power programs. Senior leaders have also expressed concern that further development of the civilian nuclear-power-generation sector

as public fears ease could make it more difficult, and expensive, to retain highly skilled specialists in the service.[61]

## THE TRANSITION TO ALTERNATIVE-FUEL NONTACTICAL VEHICLES

The Navy's plan to reduce petroleum consumption in its "nontactical" vehicle fleet seems much less advanced than in the maritime and aviation areas. Nontactical vehicles are commercial-type cars, trucks, and other automobiles for travel or transport on and off military installations. They number upward of fifty thousand vehicles but account for less than 25 percent of DoN energy use.[62] Commercial vehicles, classed according to size, are acquired independently or through the U.S. General Services Administration (GSA), which supplies fleet vehicles to government agencies.[63]

The Energy Policy Act of 1992 mandated that federal agencies make "alternative fuel vehicles" (AFVs) 75 percent of their light-duty acquisitions. In 2008 the definition of AFVs was expanded to include fuel-cell and hybrid-electric-powered vehicles, among others.[64] In compliance with this guidance, GSA has led a consistent effort to shift to AFVs, but much of its focus is on "flex fuel" vehicles, capable of running on an ethanol mix. Advances in hybrid electric and hydrogen fuel-cell technology have opened new opportunities for these vehicles, but Navy acquisition complications remain. For instance, until recently the majority of manufacturers that produced these vehicles were not eligible for GSA contracts.[65]

The Navy's 2007 AFV strategy highlighted some of the difficulties of the department's transition. Many of the issues are still being addressed: organizational alignment, communication of energy goals and successes, infrastructure to support AFVs, availability of alternative-energy vehicles through GSA lease, and efficient employment of vehicles.[66] Organizational alignment seems to be a particular difficulty; there is no single effort spearheading the way toward rapid transition to AFVs and only an uncertain strategy as to which alternative technology should be employed.

However, large commands are making significant strides toward meeting the secretary's energy goal. Navy Recruiting Command, one of the highest-mileage users of the nontactical vehicle fleet, has ordered 297 Ford Fusion hybrid cars, with the intention of converting 75 percent of its 5,100 vehicles to hybrids by 2020.[67] Naval Facilities Engineering Command began a massive effort to employ clean "Neighborhood Electric Vehicles" (NEVs) and solar-powered, slow-moving vehicles in place of conventional vehicles for flight lines, ports, material handling, public-works maintenances, and base security on installations

worldwide.[68] NEVs are smaller than conventional vehicles and not necessarily a direct replacement for them, but they are significantly cheaper, available through the GSA, require no infrastructure changes, and generate large reductions in fuel costs.[69] According to DoN, San Diego bases were able to cut about fourteen thousand gallons of petroleum per year by switching to NEVs in fiscal year 2005.[70] Smaller commands are introducing diesel-electric buses, capable of running on biodiesel, and performing initial small-scale tests with fuel-cell vehicles.[71]

## SHORE-BASED RENEWABLE ENERGY GENERATION

DoN movement toward adopting renewable energy is not restricted to vehicle fuel. The department is innovatively pursuing ocean-centric renewable energy sources. These sources will contribute to DoN's target of half of its shore-based installations reaching net-zero consumption by 2020. One of these emerging technologies is the Kinetic Hydropower System (KHPS) in Puget Sound. The Navy plans to complete design, installation, test, and evaluation of the system in two phases.[72] The KHPS is made up of a small group of turbines, rigged to the seabed, that generate power as they are turned by the immense volumes of water moving regularly with the tide.[73] The technology is very similar to wind power but has much better predictability. Phase 1 of the project began in 2008, with the goal of selecting a site and studying its environmental suitability. Phase 2 of the project will involve actual design, production, and testing.[74] Similar tests are also exploring the potential of harnessing wave power for electricity generation.

Scientists are grasping the incredible potential of harnessing the ocean for power generation, and this knowledge may now be meshing with the Navy's strategic plans. For instance, the Lockheed Martin Corporation received an $8.1 million contract from the Navy in 2009 to support development of an offshore power plant that uses the thermal energy trapped in the upper layers of tropical seas to generate electricity.[75] A subsequent $4.4 million contract was awarded in 2010 to advance the design; a pilot Ocean Thermal Energy Conversion (OTEC) plant is expected to begin operations in 2012. Conceptual designs of OTEC resemble offshore oil-drilling platforms, but in fact it is an "extremely large heat pump."[76] Warm ocean water on the surface would be used to heat a liquid, such as ammonia, causing it to evaporate; the vapor would turn turbine generators, producing electricity.[77] In the last step, the cooled water would be pumped back into the ocean at a depth with a comparable temperature, in order to prevent algae blooms and other environmentally damaging effects of tampering with the delicate temperature balance of the ocean.[78] Naval Station Pearl Harbor in Hawaii will host the first OTEC plant. Maturity of this technology could have far-reaching impacts, not only for power generation on the Pacific, Gulf of

Mexico, and southeastern Atlantic coasts but also for about eighty-five countries in tropical climate zones across the globe that are within reach of the coast.[79]

KHPS and OTEC are still years away from providing viable energy alternatives, but the Navy already runs installations that generate their own power based in whole or in part from renewable fuels. Naval Station Guantanamo Bay, Cuba, maintains wind turbines to supplement its power needs and is exploring the possibility of incinerating landfill as a power source.[80] Most notably, the Navy's geothermal facility at China Lake, California, has been supplying its own power and selling its excess power back into the regional commercial grid since 1987, generating a total of $197 million from royalties and conserved-power credit.[81] The Navy has put much of that money back into geothermal research, maintenance, and the preservation of "historic and natural resources."[82] From 1989 to 2003, China Lake spent about $125.7 million, two-thirds of its geothermal revenue, on twenty-seven irrigation and energy-conservation programs. Among other projects, these funds were used to install a solar-energy system at the Marine Corps Air Ground Combat Center, Twentynine Palms, California, eliminating its dependence on the electric grid.[83]

## INCREASING EFFICIENCY

At least 220 of today's Navy's 286 ships will still be in service in 2020 as part of the "Great Green Fleet." In order to meet alternative-energy standards, they will have to be retrofited with new power-generating equipment and hull alterations. Upgrades to hull design—reducing wave resistance, altering water flow, and cutting drag—can be costly, but they can increase fuel efficiency tremendously, saving millions of dollars. Three of these technologies have been retrofited to various surface ships during dry-dock availabilities: bulbous bows, stern flaps, and propeller and hull coatings.[84] A bulbous bow, or forefoot, looks rather like a large finger extending from the bow of a vessel at the waterline. Bulbous bows are used widely in commercial shipping and can cut fuel consumption on surface ships like destroyers by 3.9 percent.[85] Stern flaps are small extensions above the screws and rudders that lengthen the hull and alter the flow of water, cutting fuel consumption by 6–7.5 percent.[86] New "antifouling" hull and propeller coatings prevent barnacle and marine growth that creates drag, potentially saving up to $180,000 per year per ship.[87]

The Navy has also reduced its energy use by implementing simple changes at the unit and operational levels, such as acquiring high-efficiency light bulbs, mandating electricity- and water-conservation measures, and raising general awareness among service members. Such measures could be extended to the public in general in many instances, saving significant amounts of energy.

The Navy has also employed simulated, "virtual" training in lieu of live exercises, saving the cost of fuel. The Naval Sea Systems Command has spearheaded the Incentivized Energy Conservation (I-ENCON) program to help raise energy conservation awareness in the fleet.[88] The program sends representatives to meet with ship crew members about fuel saving and distributes monetary awards and cash incentives to commands achieving the best results.[89] The awards go to command discretionary funds, which can be used to acquire equipment for the ship or contribute to morale, welfare, and recreation programs.[90] In the first half of 2010 alone, I-ENCON conservation initiatives saved 386,000 barrels of fuel.[91]

## BROADER LESSONS AND SYNERGIES

DoN's alternative-energy strategy has been criticized as overambitious. Some of these criticisms deserve consideration. After all, some of the new energy technologies discussed here are still in their infancy and face significant technological hurdles; others are prohibitively expensive at present and are many years away from being serious competitors to oil. Many of the alternatives, such as nuclear power, reduce carbon emissions but present environmental challenges of their own, such as waste disposal. These impediments will, in the short term, make a switch to alternative energies difficult without significant incentives and visionary leadership. In any case, careful, comparative cost-benefit analyses are necessary.

However, with these caveats in mind, the move toward green energies and alternative technologies appears to be quite positive. The U.S. Navy is a sensible laboratory for testing and advancing these energies. Indeed, the American public is still divided on the subjects of climate change and fossil-fuel dependence, and that makes it harder for Congress or the president to implement effective market-stimulus measures. The U.S. military culture, though bedeviled by its own bureaucratic politics, is somewhat insulated from civilian political deadlock and the demands of public opinion; at least, its officials do not have to seek reelection.

The Navy is also known to be focused on preparing for national security threats. Polling data imply that the American public broadly trusts the U.S. military and its leadership to make decisions that will protect national security. It also expects the military to equip itself with the best, most innovative technology that money can buy. In the proposed fiscal year 2011 budget, the Department of Defense and Department of Veterans Affairs were two of only three departments to see increases in funding. By contrast, start-up energy companies are vulnerable to interest rates, limited cash flow, and other market factors. Many of them cannot sustain profitable operations long enough to reach important results.

One resounding message made by Navy and Defense Department leaders in arenas like last year's Quadrennial Defense Review process is that serious threats to national security are arising from dependence on fossil fuel, especially on foreign oil shipped through dangerous sea-lanes from some of the world's least stable regions. Although threats to the free flow of oil may have been exaggerated in the past three decades, a range of such threats could arise at any time under difficult circumstances—terrorist attacks on oil infrastructure, war in the Persian Gulf, and instability in key oil-producing states.[92] Recent uprisings in the Middle East, for instance, have generated fears that the Suez Canal might be affected by the turmoil or the spread of uprisings across North Africa and the Persian Gulf.

The Navy and other services are setting good examples by actively seeking energy solutions, in spite of skepticism and political controversy. Their programs can help spur similar efforts in other agencies and the private sector, but they still only represent a small percentage of the country's total consumption. Nonetheless, the Navy's experience offers some broader lessons and synergies, beyond oil dependence. For instance, as we have seen, DoN is innovatively pursuing renewable sources of electricity generation. Such power could produce needed electricity in the future when demand outstrips supply; simply pursuing alternative fuels, as such, is counterproductive if it means increased dependence on electricity generated by such sources as coal. The Navy's pursuit of multiple avenues for not only alternative fuels but renewable energy technology merits attention.

Electricity generated by sustainable methods could also help run a much larger fleet of electric vehicles. Indeed, creating more electricity does little to decrease oil dependence, because, as noted, Americans (and others around the world) put the bulk of their oil into their gas tanks. Electricity (whether solar, wind, nuclear, coal, or whatever) does not do much to decrease fuel consumption. We can't put electricity in a gas tank. However, studies show that a vehicle fleet of "plug-ins" could achieve mileages over eighty-four miles per gallon, compared to America's present average of twenty-three. In this way, used to run a national fleet of vehicles, electricity could in fact decrease oil consumption.

In terms of synergies, it may be that the Navy's research into alternative energies such as algae may dovetail with similar efforts under way in academic and business circles. Indeed, the Navy is a great laboratory for testing the value of algae-based approaches. One challenge of such approaches is to reduce costs relative to oil, partly by decreasing how much energy is used to operate them and partly by increasing their energy output. Progress in both areas might be achieved more effectively through greater cooperation among the Navy and academic and business actors.

Clearly there are significant costs to transforming energy consumption, and ultimately, without a major shift in the total population's consumption behavior the effect of individual shifts to alternative energy and technology will be minimal. But the progress made by the Navy and other services offers promise that the obstacles are not impossible to overcome. In the long run, the benefits for the United States include boosting the economy and the job market through investments in new energy industries and gaining strategic advantage in the global energy market as resources become scarce. In the meantime, the U.S. military could maintain a globally deployable force, relatively isolated from fluctuations in the oil market—an advantage over potential adversaries still dependent on traditional fuels obtained from distant or unstable regions. Should those adversaries develop alternative power for their militaries first, the roles might be reversed.

## NOTES

The opinions expressed are those of the authors and do not reflect the official policy or position of the U.S. Joint Forces Command, Department of the Navy, or Department of Defense.

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# THE "OTHER" LAW OF THE SEA

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The 1982 United Nations Law of the Sea Convention (UNCLOS) is, quite understandably, viewed by many as the "be all, end all" statement and source of the law of the sea. Not only does the convention's name imply that it occupies the field, so to speak, but its sheer size, scope, ubiquity, and near-universal acceptance support such a perception. Even the United States, which has not ratified UNCLOS, considers most of its provisions to reflect, or to have achieved the status of, customary international law and thus to be binding on nations that do not specifically decline to adhere to them.

The reality, however, is that while UNCLOS provides an overall framework for legal governance of the world's oceans and codifies such important principles as freedom of the high seas and flag-state primacy, it is by no means the single, definitive statement of the law of the sea. Other significant international conventions are widely accepted and fill some gaps in the UNCLOS framework. Importantly, many of these "other" sources of the law of the sea provide coastal and port states like the United States substantial power and authority to safeguard vital safety, security, and environmental interests within their maritime zones, including the exclusive economic zone, contiguous zone, territorial sea, and internal waters. The United States has ratified many of these conventions and incorporated their provisions into domestic law.

This article will discuss and analyze aspects of this supporting array of international maritime law. It will begin by examining UNCLOS to set out its basic framework for governance of the world's oceans. It

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*Naval War College Review, Summer 2011, Vol. 64, No. 3*

will next discuss the particulars of less widely discussed sources of the law of the sea in the vessel safety, security, and pollution realms, and demonstrate how they add "fabric," greater fidelity, to UNCLOS's general framework. The article will then discuss specifics of the American port-state control program—the means by which the United States, as a coastal/port state, utilizes control measures made available to it by these "other" sources of the law of the sea to ensure that visiting foreign vessels adhere to minimal international standards. Finally, through an analysis of U.S. port-state control program statistics and recent domestic case law, the article will assess the effectiveness of the legal regime prescribed by this "other" law of the sea.

## UNCLOS

UNCLOS is, in many respects, an amazing treaty. Hailed as "possibly the most significant legal instrument of [the twentieth] century," UNCLOS strikes a delicate balance between freedom of navigation and utilization of the oceans on the one hand, and on the other, sovereign rights and control over the ocean and its resources.[1] It solves long-standing issues that had proved to be intractable (e.g., the allowable breadth of the territorial sea) and creates new legal regimes to reflect evolving state practice (such as the exclusive economic zone). Against a backdrop of overweening national self-interest, it achieves a remarkable degree of consensus and compromise in areas that significantly impact national sovereignty and sovereign rights, particularly over resources—matters that have historically caused nations to go to, or threaten, war.[2]

The first major thing UNCLOS does is establish the limits of various maritime zones and delineate who can do what in each zone, in the airspace above them, and with respect to the resources of the water column, the seabed, and the subsoil within each zone.[3] UNCLOS permits a coastal state to declare a territorial sea that extends up to twelve nautical miles from its baseline;[4] it further permits claims to, and exercise of, sovereignty over all waters shoreward of the twelve-nautical-mile line.[5] These waters, comprising the territorial sea and a state's internal waters (the latter term referring to all waters landward of the baseline), are collectively known as "territorial waters." The rest of the world's waters are known as "international waters" and are divided into three zones:[6] a "contiguous zone," which can extend from the outer edge of a nation's territorial sea up to twenty-four nautical miles from its baseline;[7] an "exclusive economic zone" (EEZ), which can extend from the outer edge of a nation's territorial sea up to two hundred nautical miles from its baseline;[8] and the high seas, which are all waters seaward of declared EEZs.[9] International waters are not "owned" by any nation, though, as we shall see, UNCLOS does permit nations to exercise limited sovereign rights in international waters.

Second, UNCLOS codifies the doctrine of flag-state primacy. A "flag state" is a nation that confers its nationality upon ships and grants such ships the right to fly its flag. A ship has the nationality of the state whose flag it is entitled to fly; it does not necessarily have the nationality of, for example, its owner or operator (individual or corporate), crew, etc., unless any of the latter happen to be of the same nationality as the flag state.[10] Thus, a ship that is owned by an American corporation, operated by a Greek shipping company, crewed by a mixed-nationality crew, and flagged in Panama is a Panamanian vessel. It is critically important for vessels, especially those involved in legitimate international trade, to be flagged by some nation. The alternative, not to be flagged by any nation, is to be without nationality, stateless. Vessels without nationality are "international pariahs," without an internationally recognized right to navigate freely on the high seas and subject to the exercise of jurisdiction and control by all nations.[11] Clearly, the benefits to owners and operators of having flag states—ensuring their vessels can navigate freely, without being impeded by officials of non-flag-state nations except in tightly limited circumstances—outweigh the burdens and costs of flagging their vessels in particular nations.

But there are burdens and costs that come with permission to fly a nation's flag—paramount among them subjection to the law-enforcement and regulatory jurisdiction of the flag state. The term "jurisdiction" includes the right to prescribe laws and regulations that are to apply aboard a particular vessel (that is, "jurisdiction to prescribe"), the right to enforce those laws and regulations in civil or criminal tribunals ("jurisdiction to enforce and adjudicate"), and an implied right to "interfere" with the vessel to the extent necessary to exercise that jurisdiction.[12] Not only do vessels flagged by a nation become subject to its criminal laws, but UNCLOS specifically grants flag states the authority and responsibility to assert regulatory control over their vessels as well. This control includes the right and obligation to take regulatory measures designed to ensure safety at sea with regard to, inter alia, the construction, equipment, and seaworthiness of vessels; the crewing of vessels; and the ability of vessels to communicate effectively to avoid collisions.[13] Examples of such measures include periodic surveying of vessels and ensuring that adequate charts and navigational devices are carried; that crews are of appropriate size, certification, and training; and that crews observe "applicable international regulations" concerning safety and environmental stewardship.[14] In short, the flag state assumes, and owners/operators accede to, full responsibility for, and jurisdiction over, vessels that fly its flag.[15]

Having introduced UNCLOS's maritime zones and the notion of flag-state primacy, we can now turn to the regime's most important function—prescribing (in the absence of superseding agreements to the contrary) who can do what, where, on and in the world's oceans.[16] There are four classes of nation-states under

the UNCLOS scheme that have interests and equities in activities in and on the oceans: flag states, port states, coastal states, and third-party states. The extent of a nation's interests and equities will vary, depending on which of the four classes it falls into, the maritime zone at issue, the activities occurring within that zone, and the nationality of the vessel engaging in them. Two equities are of particular significance: first, the right to exercise authority, jurisdiction, and control over vessels;[17] and second, the right to control the utilization of resources, whether living or nonliving.

To start with the high seas—vessels of all nations enjoy "freedom of the high seas," which includes, among other things, freedom of navigation and of fishing.[18] Though not specifically enumerated in UNCLOS, freedom of navigation includes a freedom from interference—that is, the right of a vessel flagged by one state to proceed unmolested by officials from another state.[19] This idea is codified in UNCLOS article 92, which states that on the high seas, flag states have, with limited exceptions, exclusive jurisdiction over vessels that fly their flags.[20] In practical terms, this means—again, with limited exceptions—that only flag-state officials may interfere with the free navigation of their flagged vessels (by stopping and boarding them, for example) and take law-enforcement action as warranted (including arrest and seizure, with a view toward prosecution) aboard them on the high seas.

When a vessel flagged by one state leaves the high seas and enters the maritime zones of a coastal/port state, however, the flag state's jurisdiction over that vessel, though it still exists in full force, is no longer exclusive. The coastal/port state gains concurrent jurisdictional rights over that vessel, rights that increase as the vessel gets closer to land.[21] For example (moving shoreward from the high seas), UNCLOS grants coastal states "sovereign rights" in their EEZ to "explore, exploit, conserve, and manage" the resources, both living and nonliving, both within the water column and on and below the seabed.[22] Included within the concept of sovereign rights is the right of the coastal state to exercise jurisdiction so as to prevent and punish infractions by vessels, wherever flagged, of its resource-related laws.[23] Thus, a foreign vessel suspected of fishing in a coastal state's EEZ in violation of that state's resource laws can be boarded and searched by officials of the coastal state; further, it can be subjected to seizure and enforcement action in tribunals of the coastal state if a violation is confirmed. These coastal-state resource-related jurisdictional rights exist concurrently with flag-state rights; in other words, the flag state could choose to prohibit resource-related infractions by its vessels in foreign EEZs and could punish such violations in its own tribunals, in addition to whatever enforcement actions the coastal state takes. The flag state retains exclusive jurisdiction over its vessels for any *nonresource* infractions committed by or on board its vessels while in another nation's EEZ.[24]

The EEZ jurisdictional regime discussed above is wholly applicable within the contiguous zone as well, as that zone is entirely contained within the EEZ. In addition, UNCLOS empowers a coastal state in its contiguous zone to "exercise the control necessary" to prevent or, in the case of a vessel departing its territorial waters, punish violations of its fiscal, immigration, sanitary, or customs (known as FISC) laws.[25] Thus, for example, the coastal state could exercise jurisdiction as necessary, including enforcement action in its tribunals, against a foreign vessel that was intercepted in the contiguous zone while attempting to smuggle prohibited items from the coastal state (a customs violation). Again, these coastal-state jurisdictional rights in its contiguous zone are exercised concurrently with those of the flag state, which retains exclusive jurisdiction over its vessels in all other respects (i.e., for all nonresource, non-FISC violations) while its vessels are in foreign contiguous zones.

A coastal state's jurisdictional rights over a foreign vessel increase significantly once the vessel crosses from international waters into that state's territorial waters (that is, as defined above, its territorial sea and internal waters). UNCLOS provides a coastal state broad authority in its territorial sea to prescribe laws that apply to all vessels, including foreign vessels. Examples of what the coastal state has the right to prescribe are its criminal, fiscal, immigration, sanitary, customs, pollution, and navigational-safety laws and regulations.[26] There are only two explicit limitations in UNCLOS on the coastal state's jurisdiction to prescribe. First, it may not prescribe laws relating to foreign vessel design, construction, manning, or equipment, unless they merely implement international regulations; as we have seen, and pursuant to UNCLOS article 94, such matters are the province of the flag state.[27] Second, it may not prescribe laws so burdensome that they have the practical effect of preventing vessels from exercising a fundamental navigational right in foreign territorial seas—that is, the right of innocent passage.[28]

UNCLOS defines "innocent passage" as a foreign vessel's right to pass, in a continuous and expeditious manner, through a coastal state's territorial sea as long as during the passage the vessel engages in no act that prejudices the peace, good order, or security of the coastal state.[29] The significance here of the right of innocent passage is that a coastal state's enforcement jurisdiction—whether criminal or civil—over a foreign vessel that is legitimately in innocent passage is limited to a certain degree. First of all, a vessel driven into territorial waters due to distress or entering them to assist another vessel or aircraft is generally exempt from coastal-state enforcement of its domestic laws that would otherwise have governed that vessel's entry.[30] Second, the coastal state generally is prohibited from arresting anyone aboard a vessel in innocent passage or from taking any steps, including conducting a criminal investigation aboard the vessel, in

response to a criminal act that may have occurred before the vessel entered the territorial sea.[31] Finally, with respect to a violation occurring aboard a foreign vessel during its innocent passage, if the vessel has no intention of calling at one of its roadsteads or ports, the coastal state should not exercise its enforcement jurisdiction over that vessel except in very limited circumstances: if the consequences of the violation extend to the coastal state; if the violation is of a kind to disturb the peace of the country or the good order of the territorial sea; if the master of the ship or a diplomatic agent or consular officer of the flag state has requested the assistance of local authorities; or if enforcement proceedings are necessary for the suppression of illicit traffic in narcotic drugs or psychotropic substances.[32] It is important to note that this limitation in coastal-state enforcement jurisdiction with respect to a violation occurring aboard a foreign vessel during its innocent passage is "hortatory" only ("*should* not exercise its enforcement jurisdiction")—that is, not mandatory under international law but a discretionary exercise of coastal-state comity.

A foreign vessel that is in a coastal state's territorial sea but not in innocent passage is subject to the full legislative and enforcement jurisdiction of the coastal state;[33] after all, it is in the state's sovereign waters. Similarly, a port state has full sovereignty over its internal waters and has plenary jurisdiction over foreign vessels while they are there (there is no right of innocent passage in internal waters).[34] The port state retains plenary jurisdiction over a foreign vessel passing through its territorial sea after a call at one of the coastal state's ports for offenses committed there.[35] With respect to a vessel transiting through its territorial sea on the way to its internal waters, the port state has the right to take the necessary steps—including denial of entry—while the vessel is still in the territorial sea to prevent any breach of the conditions to which admission to internal waters is subject.[36]

Although under the UNCLOS framework a coastal/port state exercises increasing jurisdiction over a foreign vessel as the vessel approaches that state—particularly when the vessel intends to call on the state—UNCLOS is deliberately devoid of specifics in many areas. For example, while, as discussed above, UNCLOS permits a coastal state to adopt pollution laws and regulations applicable to foreign vessels in its territorial sea, the regime provides no guidance as to the nature and scope of such laws and regulations, other than that they must be "in conformity with the provisions of [UNCLOS] and other rules of international law."[37] Also, again as discussed above, under UNCLOS the flag state is principally responsible for vessel design, construction, manning, and equipment; coastal/port states may not apply their laws to foreign vessels in this realm, "unless they are giving effect to generally accepted international rules or standards."[38] But UNCLOS provides no guidance as to what such "generally accepted"

standards are, nor does it purport to set or adopt any. As the following section will show, UNCLOS does not need to do so; these standards are set by other widely accepted multilateral maritime treaties—the "other" law of the sea.

## THE "FABRIC" OF THE UNCLOS FRAMEWORK

UNCLOS relies for these purposes on dozens of such conventions, but this article will focus on five that are particularly significant and wide-ranging: the International Convention for the Safety of Life at Sea (the SOLAS Convention); the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code); the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention); the International Convention for the Prevention of Pollution from Ships (MARPOL Convention); and the International Ship and Port Facility Security Code (ISPS Code).

Before turning to the specifics, however, a few background topics need to be discussed. The first of these is the "organization that has probably had the most substantial direct effect on the law of the sea"—the International Maritime Organization.[39] The IMO is the "United Nations' specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships."[40] The convention establishing the IMO was adopted in 1948 and came into effect in 1958; the IMO's first meeting was held in 1959. Most of its work is done in committees, including the Maritime Safety Committee, the Marine Environment Protection Committee, and the Legal Committee. These bodies identify needs for new conventions or for amendments to existing ones. All of the important conventions to be discussed in this section were adopted under the auspices of the IMO, which today oversees the process of keeping these conventions abreast of developments in maritime and related industries.

The second preliminary point is the role of nongovernmental entities in helping flag states carry out their responsibilities. These entities fall into two categories: "recognized organizations" (in this context, classification societies) and "recognized security organizations" (RSOs). A classification society is an organization that "establish[es] and appl[ies] technical standards in relation to the design, construction and survey of marine related facilities including ships and offshore structures."[41] An RSO is an entity that an ISPS signatory state may authorize to undertake certain security-related activities on its behalf, including approval of Ship Security Plans or amendments thereto; verification and certification of ships' compliance with ISPS requirements; and conduct of Port Facility Security Assessments.[42] The significance of these nongovernmental entities, of both kinds, is that the extent to which any given foreign vessel is likely to be selected for safety or security examination depends on the demonstrated,

historical performance not only of its flag state but also of the nongovernmental entity to which those responsibilities have been "subcontracted."

Finally, the "other" law of the sea, like UNCLOS, consists of treaties that are notionally binding only on signatory states. Thus, theoretically, nonsignatory nations do not have to comply with their standards, and coastal/port states cannot formally utilize the specific provisions of these treaties when taking, or anticipating the need to take, control actions aboard vessels of nonsignatory states. But the reality is that the vast majority of nations in general, and flag states in particular, have adopted them. A very few vessels flagged by nonsignatory states do engage in international trade; it can certainly be argued, however, that many of the provisions of the supplementary instruments are so widely adhered to that they have acquired the status of customary international law, binding for those states too, if they have not expressly "opted out." This argument, coupled with UNCLOS's grant of authority to port/coastal states to ensure foreign vessel adherence to "other rules of international law" and "generally accepted international rules or standards," gives such states significant clout over vessels flagged by states that have not specifically adopted those rules and standards.[43]

***The SOLAS Convention.*** The International Convention for the Safety of Life at Sea, 1974, as amended, prescribes minimum standards for the construction, equipment, and operation of ships. The genesis for the convention was the disastrous RMS *Titanic* sinking in 1912, which led to the first iteration of SOLAS in 1914. Since then it has been comprehensively revised several times.[44] The most recent version, that of 1974, entered into force on 25 May 1980; it has been adopted by 159 nations, including the United States, which collectively represent 99.04 percent of world shipping tonnage.[45] According to the IMO, "the SOLAS Convention in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships."[46]

The real substance of SOLAS is in the annex, which is divided into twelve chapters, as follows: chapter I, "General Provisions"; chapter II-1, "Construction Subdivision and Stability, Machinery and Electrical Installations"; chapter II-2, "Fire Protection, Fire Detection, and Fire Extinction"; chapter III, "Life-Saving Appliances and Arrangements"; chapter IV, "Radiocommunications"; chapter V, "Safety of Navigation"; chapter VI, "Carriage of Cargoes"; chapter VII, "Carriage of Dangerous Goods"; chapter VIII, "Nuclear Ships"; chapter IX, "Management for the Safe Operation of Ships"; chapter X, "Safety Measures for High-Speed Craft"; chapter XI-1, "Special Measures to Enhance Maritime Safety"; chapter XI-2, "Special Measures to Enhance Maritime Security"; and chapter XII, "Additional Safety Measures for Bulk Carriers."

Within each chapter are detailed standards that establish minimum performance benchmarks in each area. Flags states are responsible for their vessels' compliance with these standards and for certifying compliance; examples include the Safety Construction Certificate, Safety Equipment Certificate, Safety Radio Certificate, and Passenger Ship Safety Certificate. The convention permits port states to inspect such certificates aboard foreign vessels and to conduct further examinations, and possibly take control measures, if onboard conditions clearly do not comport with the certificates.

***The ISM Code.*** The International Management Code for the Safe Operation of Ships and for Pollution Prevention was adopted in 1993 in response to human errors or omissions that had apparently played causal roles in significant marine casualties during the 1980s.[47] In 2002, IMO Resolution MSC.99(73) created a new chapter IX ("Management for the Safe Operation of Ships") in SOLAS incorporating the ISM Code into that convention; as a result, all SOLAS signatory nations are also now bound by the code. To accomplish its goal of promoting safety and environmental protection through the minimization of human error, the ISM Code requires shipowners and other persons, such as managers or bareboat charterers, who assume responsibility for operating the ship (we will refer to them below, generically, as "the company") to implement Safety Management Systems.[48] These systems (mostly in the form of checklists) must be documented and maintained in a Safety Management Manual to be kept on board the vessel.

A Safety Management System should contain the following functional elements:

- A safety and environmental-protection policy
- Instructions and procedures to ensure safe operation of ships and protection of the environment in compliance with relevant international and flag-state legislation
- Defined levels of authority and lines of communication between, and among, shore and shipboard personnel
- Procedures for reporting accidents and nonconformities with the provisions of the code
- Procedures to prepare for and respond to emergency situations
- Procedures for internal audits and management reviews.[49]

Examples of instructions and checklists required in the Safety Management Manual are those that define various tasks and assign qualified personnel to

carry out key shipboard operations that impact the safety of the ship and the prevention of pollution; that establish procedures to identify, describe, and respond to potential emergency shipboard situations and establish a program for drills and exercises to prepare for emergency actions; and that establish procedures to ensure that the ship is maintained in conformity with the provisions of relevant rules and regulations and with any additional requirements that may be established by the company.

Flag states are primarily responsible for ensuring their vessels' compliance with the ISM Code, since it is part of SOLAS. A signatory flag state attests to a company's compliance with ISM by issuing certificates, which include a Document of Compliance, issued to the operating company upon verification that it meets ISM requirements, and a Safety Management Certificate, issued to a company's vessels to attest their compliance with these same requirements. Again, as with SOLAS, port states are permitted to inspect such certificates, conduct further examinations, and take control measures aboard foreign vessels as warranted if a vessel clearly does not meet the minimum standards that the certificates are supposed to ensure.

***The STCW Convention.*** Having safety, maintenance, and equipment operation checklists in a Safety Management System is one thing; having qualified, proficient mariners to carry out important shipboard functions is quite another. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, which was adopted on 7 July 1978 and entered into force on 28 April 1984, was devised to prescribe uniform international minimum standards for the training and certification of, and watch keeping by, mariners. One hundred fifty-four nations, which collectively flag 99.15 percent of global shipping tonnage, have adopted the convention.[50]

The STCW Convention comprises chapter I, "General Provisions"; chapter II, "Master and Deck Department"; chapter III, "Engine Department"; chapter IV, "Radiocommunication and Radio Personnel"; chapter V, "Special Training Requirements for Personnel on Certain Types of Ships"; chapter VI, "Emergency, Occupational Safety, Medical Care and Survival Functions"; chapter VII, "Alternative Certification"; and chapter VIII, "Watchkeeping." The basic requirements of the convention are enlarged upon by the STCW Code, created as part of amendments to the convention in 1995. The convention's chapters and the code provide specific training, experience, and other requirements that a mariner must possess in order to be certified to serve in a particular capacity aboard a vessel.

Unlike with most other IMO-sponsored international agreements, the main onus for compliance with STCW rests not with the flag state but instead with the

country ("administration") certifying a particular mariner as being trained and competent in accordance with international standards.[51] This certification by the administration is done through a statement of compliance in the credentials (licenses, certificates of documentation, etc.) that are issued to merchant mariners.

***The MARPOL Convention.*** The International Convention for the Prevention of Pollution from Ships "is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes."[52] It antedates UNCLOS, being a combination of two treaties adopted in 1973 and 1978, respectively. The convention contains five technical annexes; a sixth annex was adopted via a protocol of 1997. These annexes prescribe, in significant detail, standards to minimize or prevent pollution from ships, whether from accidental discharges or routine ship operations. Adherence to annex I ("Prevention of Oil Pollution") and annex II ("Prevention of Pollution by Noxious Liquid Substances in Bulk") is mandatory for all MARPOL signatory states; compliance with the remaining annexes, III–VI (respectively, "Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form," "Prevention of Pollution of the Sea by Sewage," "Prevention of Pollution from Garbage," and "Prevention of Air Pollution from Ships") is discretionary. One hundred fifty nations, representing 99.14 percent of global shipping tonnage, have signed on to annexes I and II; somewhat fewer, but in no case a number representing less than 82 percent of global shipping tonnage, have signed the other annexes.[53]

As with other such conventions, signatory flag states bear the principal onus of ensuring that their vessels comply with MARPOL's requirements, signifying their vessels' compliance by issuing certificates. These include, as appropriate, an International Oil Pollution Prevention (IOPP) Certificate; an IMO Certificate of Fitness for Ships Carrying Liquefied Gases in Bulk; an IMO Certificate of Fitness for Carriage of Dangerous Chemicals in Bulk; and an International Air Pollution Prevention Certificate. Such certificates are required to be carried by vessels of signatory flag states.

One other point of significance in relation to MARPOL is that whereas under UNCLOS a coastal/port state *may* enact pollution legislation that applies to foreign vessels in waters subject to its jurisdiction, a state party to MARPOL *must* make that convention's provisions applicable to vessels, even foreign ones, in waters subject to its jurisdiction.[54] The United States has codified MARPOL in its domestic law through the Act to Prevent Pollution from Ships (Title 33, *United States Code,* arts. 1901–15) and associated regulations.

***The ISPS Code.*** The International Ship and Port Facility Security Code, a comprehensive set of measures to enhance the security of ships and port facilities,

was developed in response to the perceived threats to ships and port facilities in the wake of the 9/11 attacks in the United States. It is implemented through chapter XI-2, "Special Measures to Enhance Maritime Security," of the SOLAS Convention. The code, which entered into force on 1 July 2004, has two parts, one mandatory and one recommendatory. The United States, as a SOLAS signatory, is bound by the ISPS Code, and has incorporated ISPS into its domestic regulations in Title 33 of the *Code of Federal Regulations,* subchapter H.

ISPS prescribes complementary security measures to be taken both aboard vessels and at port facilities. Contracting governments are required to conduct security assessments of their port facilities and are responsible for ensuring that shipping companies assess all vessels flying their flags. Each facility and vessel is then required to create a security plan (Port Facility Security Plan or Ship Security Plan) outlining the operational and physical security measures the facility or ship will have in place during normal operations and in heightened security circumstances. Every ship is required to carry an International Ship Security Certificate indicating that it complies with the requirements of SOLAS chapter XI-2 and part A (the mandatory part) of the ISPS Code.

There are many more conventions that support the UNCLOS framework, some that further explain and supplement the five discussed here. For example, chapter VII of SOLAS, which makes mandatory the International Maritime Dangerous Goods Code, also variously refers to such supplementary doctrine as the International Bulk Chemical Code, the International Gas Carrier Code, and the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships.

These conventions—the five discussed and the others like them—do not apply to all vessels; in fact, each has complicated applicability provisions, involving vessel type and tonnage.[55] Nevertheless, it is fair to say that the conventions described above embody the most significant and comprehensive "other" law of the sea, applicable to the vast majority of vessels involved in international commercial service. Such vessels are the principal focus of port states, which desire to minimize the deleterious safety, pollution, and security effects of such vessels for their sovereign territories. Port states protect their vital interests in such areas by an inspection and control regime known as "port-state control."

## PORT-STATE CONTROL

Under this regime a port state may take measures that include boardings and inspections, followed by control actions as necessary in response to any identified discrepancies. Collectively, for each port state these measures exist within a comprehensive framework called the "port-state control" (PSC) program. The

American PSC program, which is administered by the U.S. Coast Guard, will be examined as representative of such programs worldwide.

The primary goal of the American PSC program is to eliminate substandard vessels (those "whose hull, machinery, equipment, or operational safety is substantially below the minimum standards required by the relevant convention or whose crew is not in conformance with the safe manning document") from U.S. waters.[56] The first step is to board and inspect vessels for compliance with safety, security, and environmental-protection standards. With thousands of foreign vessels visiting American ports every year and inspection resources spread thin, not every vessel can be boarded and inspected. Instead, the Coast Guard selects vessels for boarding and inspection, by two methods: first, targeting specific vessels likely not to be in compliance, as indicated by their scores on a targeting matrix (discussed below); and second, randomly selecting other vessels, whatever their targeting-matrix scores, just to keep everyone honest.

There are two targeting matrices, one for safety and one for security. The safety matrix—officially called the "Safety and Environmental Protection Compliance Targeting Matrix"—looks at five aspects of a vessel and assigns points based on its demonstrated performance with respect to each.[57] The categories examined are ship management (who the owner, operator, or charterer is); flag state; recognized organization (i.e., classification society); vessel history; and particulars (type of vessel, age, etc.). With respect to point assignment, and using the flag-state category as an example, vessels flagged by a state that has a detention ratio (discussed later) two or more times the average of all flag states will be assigned seven points; if the flag state has a detention ratio above the average but less than twice the average, the vessel is assigned two points; otherwise its score in the "flag state" category is zero.[58] Vessels assigned seventeen or more points by the overall targeting matrix, that have been involved in marine casualties that may have affected seaworthiness, that Coast Guard Captains of the Port determine to be potential hazards to the port or the environment, or whose classification societies have detention ratios of 2 percent or more are all deemed "Priority I" vessels and will be boarded.[59] Vessels that receive seven to sixteen points on the matrix are "Priority II," and those that score six points or lower are considered nonpriority vessels. Priority II vessels may be boarded as resources permit; any non–Priority I vessel may be selected for examination by the PSC random-selection process but will typically otherwise not be examined.[60]

The system is virtually identical on the security side, though the features examined in the security matrix—officially, the "ISPS/MTSA Security Compliance Targeting Matrix"—are somewhat different.[61] The ship-management and flag-state categories examine the same features, though the point assignments are somewhat different. "Recognized organization" in this case looks not at

classification societies but at recognized security organizations (that is, RSOs). The other two categories are the vessel's security-compliance history and its past ports of call. Vessels that score seventeen points or higher, that have had more than three RSO-related control actions in the last twelve months, that have been denied entry to or expelled from a port for ISPS-related reasons in the past twelve months, or whose last five ports of call include any listed in the *Federal Register* as not compliant with the ISPS Code are considered "ISPS I" vessels and are to be examined while still at sea.[62] "ISPS II" vessels (with scores between seven and sixteen points or having new owners or flag states since the last ISPS exam) are examined in port. "ISPS III" vessels are usually not subject to security examinations, unless selected randomly.[63]

Once aboard a foreign vessel, PSC inspectors examine its documents for the necessary certificates of compliance with safety/environmental and security requirements. The international conventions permit officials of the coastal/port state not only to examine the certificates supplied but to determine their validity.[64] For example, the inspectors may require crew members to conduct fire-fighting drills to demonstrate that they are in fact trained in that evolution, as the Safety Management Certificate attests; to lower and raise a lifeboat to ensure that the davit works properly and that the crew knows how to operate it; or to demonstrate the operation of pollution-prevention equipment, such as the oily-water separator (or OWS, a device that removes oil from a ship's bilgewater so the cleansed bilgewater can be discharged overboard).

If, as a result of the inspection, the PSC inspector determines there are "clear grounds" to believe that the vessel has security violations or only a marginal level of safety, the coastal/port state is authorized to impose control measures. The "clear grounds" standard differs, depending on the nature of the problem. Any security deficiency, regardless of nature, is sufficient.[65] With respect to safety or environmental issues, the deficiency has to pose a significant impact to the crew, vessel, port, or environment.[66]

If clear grounds do exist, the possible control measures include, in decreasing order of severity:

- Denial of entry, or expulsion
- Detainment[67]
- Captain of the Port order[68]
- Customs hold[69]
- Restrictions of operation/vessel movement
- Delay

- Comprehensive security inspection[70]
- Letter of deviation[71]
- Flag-state notification
- Lesser administrative/corrective measures.

Enforcement measures available to port states include judicial civil-penalty proceedings for major noncriminal violations, repeat violations, or minor violations not corrected before the vessel returns to an American port; administrative civil penalties for lesser violations; or letters of warning. Also, of course, as discussed in the following section, criminal prosecution is possible in the most egregious cases.

## SOME STATISTICS AND A CRITICAL ANALYSIS THEREOF

The United States publishes PSC statistics annually. According to the 2009 report, in that year

> a total of 8,557 individual vessels, from 86 different Flag Administrations [i.e., flag states], made 75,902 port calls to the United States. The Coast Guard conducted 9,657 SOLAS safety exams, and 8,725 ISPS exams on these vessels. The total number of ships detained in 2009 for environmental protection and safety related deficiencies decreased [from the previous year] from 176 to 162. The total number of ships detained in 2009 for security related deficiencies decreased from 27 to 18. During calendar year 2009, we saw a drop in nearly all of the key tracking factors, likely owing to the downturn of world economic conditions.[72]

The report tracks statistics from previous years in three-year groups. For the three-year window ending in 1997, 6.64 percent of PSC inspections resulted in vessel detentions for safety and environmental reasons. During the three years ending in 2009, that ratio dropped to 1.92 percent. For security inspections the statistics do not reach as far back, as the ISPS convention is of relatively recent origin. Nonetheless, the 2009 report indicates that the three-year ISPS control-action ratio has steadily declined, from 0.89 percent for the period ending in 2005 to 0.34 percent for the three years ending in 2009.[73]

These statistics appear to indicate that flag states are taking seriously their responsibilities under the "other" law of the sea, which would obviously be a positive development. However, there are some grounds for skepticism. First of all, these are statistics for vessels arriving in U.S. ports. The United States has been very aggressive in the administration of its PSC program—in fact, in the eyes of some, too aggressive.[74] Whatever the truth of the latter assertion, the mere perception by operators of substandard vessels that their ships might be more stringently examined in the United States than in other nations' ports, with expensive

delays if detained, may make such operators reluctant to send them here. In short, positive safety and security statistics in the United States do not necessarily mean that vessels are everywhere becoming more compliant; it just may mean that problem vessels are going elsewhere.

Second, the numbers, while encouraging, suggest a compliance plateau in recent years, if not a marginal decrease. The three-year average detention ratios (percentages) for environmental and safety noncompliance for the periods between 1997 and 2009 are as follows: in 1997, 6.64; in 1998, 6.02; in 1999, 5.08; in 2000, 3.55; in 2001, 2.69; in 2002, 2.40; in 2003, 2.22; in 2004, 2.30; in 2005, 2.00; in 2006, 1.78; in 2007, 1.60; in 2008, 1.75; and in 2009, 1.92.[75] As these statistics indicate, performance improved dramatically between 1997 and 2001 and only incrementally after that. In fact, in recent years there has been a slight decline in compliance. While the overall numbers are much improved in the past decade, the statistics appear to show that, for cost reasons or otherwise, a compliance ceiling has been reached, upon which it may prove hard to improve.

Finally, there is the valid criticism that the PSC inspections largely focus on documents issued by the flag state (IOPP Certificates, etc.), paperwork that may not truly reflect the material or security conditions aboard the vessel—that may even, as one author has put it, be "used as a façade behind which groups or companies can do whatever they please."[76] A recent case in the United States demonstrates that such disconnects between documentary certification and actual vessel conditions can and do occur. In *United States v. Hugo Pena (et al.),* a vessel surveyor working for Universal Bureau Shipping (a recognized classification society) and acting on behalf of the government of Panama issued the Panamanian-flagged vessel *Island Express I* an IOPP Certificate on 15 April 2010.[77] This certificate attested that the vessel's pollution-prevention equipment, including its oily-water separator, was fully operable. On 4 May, nineteen days later, American PSC inspectors boarded the vessel and discovered that its OWS was in fact out of commission. Subsequent investigation revealed that the class surveyor, a Mr. Pena, had known the OWS was not operable on 15 April but had issued the IOPP Certificate anyway. This was a violation of MARPOL and U.S. law, and it resulted in his felony prosecution and conviction in U.S. court—the first-ever MARPOL conviction in an American court of a class inspector for issuing fraudulent certificates.

Notwithstanding these potential grounds for criticism, it seems that the safety, security, and environmental protection regimes beyond UNCLOS can be, and have been, effective. Anecdotally, despite the construction and operation of supertankers and the increasing quantities of petroleum products being shipped worldwide, spectacular vessel breakups and spills have not occurred in recent years in the numbers that the world experienced even a few decades

ago—*Amoco Cadiz, Torrey Canyon, Exxon Valdez*. Industry statistics back up this impression. The average annual number of significant oil spills (over seven hundred tons) from tankers in the 1970s was 25.4; in the 1980s, 9.3; in the 1990s, 7.9; and from 2000 to 2009, 3.3.[78] The amount of cargo being shipped on the world's oceans is indeed vast and increasing—approximately thirty-three trillion ton-miles in 2009, up from approximately twenty-three trillion ton-miles in 2000.[79] Nonetheless, total ship losses of vessels five hundred gross tons and above have been cut nearly in half during the same period—from nearly 150 in 2000 to fewer than seventy-five in 2009.[80]

There are many multilateral treaties that fill in the UNCLOS framework. These instruments are widely accepted and implemented, and they promote order and the free flow of commerce by prescribing universal standards for vessel construction, operation, and management, for the training and qualification of mariners, and the like. In accordance with the 1982 United Nations Convention on the Law of the Sea, they assign compliance responsibility to flag states. However, in the spirit of "trust but verify," they contain real enforcement mechanisms that enable coastal and port states to safeguard their vital interests, even in the face of occasionally lackadaisical flag-state oversight. Taken together, this "other" law of the sea serves a valuable purpose, the promotion of vessel safety and security and environmental stewardship. Statistics suggest that it is achieving its goals.

NOTES

1. Quotation from statement of Secretary-General Javier Pérez de Cuéllar upon signing UNCLOS in 1982.
2. It is widely acknowledged that the War of 1812 was caused in large part by American resentment of England's practice of stopping U.S. vessels on the high seas and "impressing" sailors from those vessels into British naval service. More recently, a dispute between Spain and Canada in 1995 over the turbot fishery (known as the "Turbot War") in the North Atlantic threatened to devolve into warfare when both nations deployed warships to the disputed area.
3. UNCLOS adopts in large part, and builds upon, maritime zone schemes that were less comprehensively codified in earlier international conventions, such as the 1958 Geneva Conventions on the Law of the Sea.
4. A nation's baseline is typically the low-water line on its shores; however, UNCLOS contains rules in part II (Territorial Sea and Contiguous Zone) that govern establishment of a baseline when facing irregular shoreline features (bays, low tide elevations, etc.).
5. UNCLOS, arts. 2 and 3.
6. "International waters" is not a term of art under UNCLOS, but it is commonly used to describe the waters beyond the sovereign waters of the world's territorial seas.
7. UNCLOS, art. 33.
8. Ibid., art. 57.
9. Ibid., art. 86.

10. Ibid., art. 91.
11. *United States v. Marino-Garcia,* 679 F.2d 1373 (11th Cir. 1982).
12. For example, 14 *United States Code* (hereafter USC) § 89 authorizes designated Coast Guard officials to go on board, at any time, any vessel subject to the jurisdiction of the United States; to address inquiries to those on board, examine ship's documents and papers, and examine, inspect, and search the vessel; to arrest and seize as warranted; and to use all necessary force to compel compliance with orders.
13. UNCLOS, art. 94.
14. Ibid.
15. A flag state may, and typically does, contract with a classification society (discussed in the following section of this article) to assist it in highly technical matters related to vessel design, construction, and maintenance.
16. Nations are free to enter into bilateral or multilateral agreements that modify UNCLOS's general principles. The conventions comprising the "other" law of the sea discussed later in this article are perfect examples of such agreements.
17. Jurisdiction over vessels includes jurisdiction over persons aboard, as well as (often) vessel owners, managers, agents, etc. It is important to note that jurisdiction may not be exercised against warships and other government vessels in noncommercial service. UNCLOS, arts. 32, 95, and 96.
18. Ibid., art. 87.
19. Myres McDougal and William Burke, *The Public Order of the Oceans: A Contemporary International Law of the Sea* (New Haven, Conn.: Yale Univ. Press, 1962), p. 869.
20. Those exceptions include universal crimes (e.g., piracy); flag-state consent, either standing or ad hoc; hot pursuit; constructive presence; right of visit; master consent; and, conceivably, jurisdiction pursuant to a UN Security Council resolution.
21. It should be noted that although a flag state retains full jurisdiction over its vessels wherever they are, the reality is that the flag state will be unable to exercise its jurisdictional rights over a vessel in the territorial waters of another state without the consent of that state to enter those waters and do so.
22. UNCLOS, art. 56(1).
23. Ibid., art. 73.
24. Ibid., arts. 58(1) and (2).
25. Ibid., art. 33.
26. Ibid., arts. 21(1) and 211.
27. Ibid., art. 21(2).
28. Ibid., arts. 24(1)(a), 211(4).
29. Ibid., arts. 17–19. The limited exception to the "continuous and expeditious" passage requirement is that stopping and anchoring is permitted if it is an incident of ordinary navigation; it is made necessary by some life-threatening distress aboard the vessel; or it is incident to a vessel's rendering assistance to another vessel or aircraft in distress.
30. U.S. Navy Dept. and U.S. Transportation Dept., *The Commander's Handbook on the Law of Naval Operations,* Naval Warfare Publication 1-14M (Washington, D.C.: 2010 rev.), sec. 3.2.2. For example, the distressed vessel or would-be rescuer would not be subject to the coastal state's customs, notice of entry, or other laws that regulate the means and manner by which vessels may enter territorial waters. The distressed vessel or would-be rescuer, however, is not entitled to blanket immunity from coastal-state enforcement of its other (non–condition of entry) domestic laws.
31. UNCLOS, art. 27(5).
32. Ibid., art. 27(1).
33. Non-innocent passage would include lingering, loitering, or engaging in an activity that is prejudicial to the peace, good order, or security of the coastal state. UNCLOS, art. 19, contains a list (in the U.S. view, an exclusive list) of activities that are per se prejudicial to the coastal state's peace, good order, or security and that are thus inconsistent with innocent passage.
34. As in the territorial sea, a port state may, as a matter of international comity, decline to exercise its enforcement jurisdiction over a foreign vessel in its internal waters if a crime or incident aboard the vessel does not disturb the "peace of the port" and instead "hand off" disposition of the matter to the flag state.

But see note 21 concerning a flag state's ability to take enforcement action while its vessel is in the territorial waters of another nation.

35. UNCLOS, art. 27(2).
36. Ibid., art. 25(2).
37. Ibid., art. 21(1).
38. Ibid., art. 21(2).
39. R. R. Churchill and A. V. Lowe, *The Law of the Sea,* 3rd ed. (Dover, N.H.: Manchester Univ. Press 1999), p. 23.
40. *IMO: International Maritime Organization,* www.imo.org/.
41. "Classification Societies: What, Why and How?" *International Association of Classification Societies,* www.iacs.org.uk/. IMO Resolution A.739(18) prescribes minimum performance standards for classification societies.
42. ISPS Code, B/4.3.
43. See, generally, Anna Mihneva-Natova, *The Relationship between United Nations Convention of the Sea and the IMO Conventions* (New York: United Nations and Nippon Foundation of Japan, [2005]), available at www.un.org/.
44. There have been many less comprehensive amendments and additional protocols since then.
45. "Status of Conventions Summary," *IMO: International Maritime Organization,* www.imo.org/.
46. "International Convention for the Safety of Life at Sea (SOLAS), 1974," *IMO: International Maritime Organization,* www.imo.org/.
47. Adopted through IMO Resolution A.741(18).
48. A "Safety Management System" is a structured and documented system enabling company personnel to implement effectively the company's safety and environmental-protection policy. ISM Code, sec. 1.1.4.
49. ISM Code, sec. 1.4.
50. See note 45 above.
51. This reflects the reality that in the global shipping world, vessels flagged in one state are frequently crewed by mariners from one or more other states.
52. "International Convention for the Prevention of Pollution from Ships (MARPOL)," *IMO: International Maritime Organization,* www.imo.org/.
53. "Status of Conventions Summary."
54. MARPOL, art. 4(2).
55. U.S. Homeland Security Dept., "Coast Guard Port State Control Targeting and Examination Policy for Vessel Security and Safety," Navigation and Vessel Inspection Circular [hereafter NVIC] 06-03, Commandant United States Coast Guard Publication [hereafter COMDTPUB] P16700.4, change 2 (Washington, D.C.: 27 March 2007), encl. 4, table 4.
56. Ibid., encl. 4, p. 1.
57. U.S. Homeland Security Dept., *Port State Control in the United States: Annual Report 2009* (Washington, D.C.: 2009), p. 8.
58. Ibid.
59. Each U.S. port has a designated federal Captain of the Port (COTP), who is the senior Coast Guard officer with responsibility for enforcing, within that port, "port safety and security and marine environmental protection regulations, including, without limitation, regulations for the protection and security of vessels, harbors, and waterfront facilities; anchorages; security zones; safety zones; regulated navigation areas; deepwater ports; water pollution; and ports and waterways safety" (*Code of Federal Regulations,* Title 33 [hereafter 33 CFR], § 1.01-30).
60. U.S. Homeland Security Dept., *Port State Control in the United States,* p. 8.
61. Ibid., p. 18. The MTSA, or Maritime Transportation and Security Act, is the U.S. law that implements ISPS domestically. MTSA is codified at 46 USC § 70101 *et seq.*
62. U.S. Homeland Security Dept., *Port State Control in the United States.* For the *Federal Register,* see www.federalregister.gov/.
63. Ibid.
64. See, for example, SOLAS, chap. I, regulation 19, and chap. XI-2, regulation 9 (with respect to ISPS verification); also MARPOL, art. 5(2).
65. NVIC 06-03, encl. 4 note l, p. 5.
66. Ibid.

67. A "detention" is a significant control action that triggers, among other things, notification of the vessel's flag state and of the classification society or recognized organization that issued the certificates relating to the subject of the detention; see U.S. Homeland Security Dept., "Port State Control Guidelines for the Enforcement of Management for the Safe Operation of Ships (ISM Code)," NVIC 04-05, COMDTPUB P16700.4 (Washington, D.C.: 1 August 2005), p. 9. NVIC 06-03, encl. 4, app. A provides examples of detainable deficiencies for both safety and security.

68. 33 CFR § 160.111 grants the COTP authority to order a vessel to anchor or to operate in the manner directed when, inter alia, he or she has reasonable cause to believe that the vessel is not in compliance with any law, regulation, or treaty.

69. 46 USC § 60105 requires foreign vessels to obtain customs clearance before departing a U.S. port for another American port or a foreign port. Various authorities permit the U.S. Customs and Border Protection Service to withhold customs clearance of a foreign vessel at the request of the Coast Guard to ensure, for example, that the vessel posts a letter of undertaking or surety bond to guarantee payment of civil penalties assessed or likely to be assessed. See, for example, 46 USC § 70121 and 33 CFR § 160.115.

70. A "comprehensive security inspection" is similar to an expanded vessel examination in the safety/environmental-protection realm; it involves a detailed review of the vessel's security program.

71. 33 CFR § 164.55 authorizes the COTP to permit a vessel to deviate from the equipment and operational requirements of 33 CFR Part 164 if he or she deems the deviation will not impair the safe navigation of the vessel under anticipated operating conditions.

72. U.S. Homeland Security Dept., *Port State Control in the United States,* p. 2.

73. Ibid., p. 5.

74. Foreign crew members have received felony convictions in U.S. federal court for violating American environmental statutes; see, for example, *United States v. Jho,* 534 F.3d 398 (5th Cir. 2008). The United States has been criticized at the IMO and elsewhere for overreaching in this and related cases.

75. U.S. Homeland Security Dept., *Port State Control in the United States,* p. 5.

76. William Langewiesche, *The Outlaw Sea* (New York: North Point, 2004), p. 33.

77. *United States v. Hugo Pena (et al.),* U.S. District Court, Southern District of Florida, case no. 10-60158-CR-WPD(S), decided on 20 December 2010.

78. "Data and Statistics," *International Tanker Owners Pollution Federation Limited,* www.itopf.com/.

79. "Fearnresearch," *Astrup Fearnley,* www.fearnleys.com. Total seaborne trade during the same period rose from 5,595 million metric tons in 2000 to 7,636 million metric tons (estimated) in 2009.

80. "Hull Spring Statistics as of December 31, 2009," *International Union of Marine Insurance,* iumi.com/. The total loss figure was much worse in the 1980s, with over two hundred vessels of five hundred gross tons or larger being lost every year during the first half of the decade.

# SIX AMAZING YEARS

## RAGs, NATOPS, and More

*Vice Admiral Robert F. Dunn, U.S. Navy (Retired)*

In the early 1950s the U.S. Navy and Marine Corps were suffering near-catastrophic accident rates. In 1954 alone the Navy/Marine Corps accident rate was almost fifty-five major mishaps per hundred thousand flight hours, meaning that 776 aircraft and 535 aviators were lost. This was unsustainable. Two British inventions, the angled flight deck and the optical landing system, ameliorated the problems of flying jet aircraft at sea, but widespread safety problems persisted, not only in carrier operations but in shore-based operations as well. It was apparent that beyond carrier modifications and other technological fixes, there were institutional changes that needed to be made. This article chronicles several of these changes at a critical period in the service's history.

Between the start of 1958 and the end of 1963 the Navy and Marines logged a remarkable achievement in aviation safety. In a period of only six years that included intensive operations with some of the most difficult aircraft in the fleet—Crusaders, Demons, Skyrays, Tigers, Phantoms, Vigilantes, and Skywarriors—the Navy-wide major mishap rate was reduced by more than half and was launched on a downward trajectory that continues to this day.[1] In those six years were established replacement air group (RAG) training, a system of "level readiness," a Naval Aviation Training and Operations Procedures Standardization (NATOPS) program, an improved system for selection and assignment of personnel, a more responsive system for maintenance and supply support, and more. Several of these programs go hand in glove and need to be discussed together.

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*Naval War College Review, Summer 2011, Vol. 64, No. 3*

## REPLACEMENT AIR GROUP TRAINING

Replacement training was the first of the concepts developed in that six-year period, but once adopted it led into others, especially level readiness and NATOPS.

Formerly, before replacement training was institutionalized, newly designated aviators or those being reassigned from other duty had reported directly to fleet squadrons, usually while the squadrons were between deployment regroup and "workup" status. It was up to the squadron to check out the "nugget," or "newbie," in whatever aircraft the squadron happened to be flying. For aviators who had flown similar aircraft in the training command or at previous duty stations, there was no great difficulty; however, those going to jet squadrons who had never before flown a jet had a real problem. In some ways it was even harder for the more senior pilots, likely to be coming from shipboard or shore duty where they had flown little but twin-engine Beech SNB-5s four hours each month, to maintain general proficiency and qualifications; they were now expected not only to master a new kind of airplane but to lead as well.

A related issue particularly pertinent to carrier squadrons manifested itself when, later in the training cycle, it was time to work at the scale of an air group —that is, the aviation units that would be assigned, under an overall commander, to an aircraft carrier. Normally, there were no more than casual exchanges among the squadrons within an air group. This was a special problem with the "air task groups"[2] left over from the Korean War and with the various detachments needed to flesh out an air group's capabilities.[3] Leaders did not know one another, and junior pilots did not know the senior officers of other squadrons or on the air group staff. No one knew much about working with other types of aircraft in the air, as they would have to once air-group operations began—usually during workups at the naval air stations at, say, Guantanamo Bay (Cuba) or Fallon (Nevada), or upon embarkation on board the assigned carrier.[4]

A third group of issues for carrier air groups had to do with specialty training, maintenance, and supply. Except for air task groups an attempt was made to base all squadrons of an air group at the same naval air station in order to facilitate air group command and control, but the resulting need to distribute such facilities among several air stations exacerbated problems of training, maintenance, and supply generally. For example, if each air group had a squadron of F9F-6 Cougars, a squadron of F9F-5 Panthers, another of FJ-4 Furies, and one of AD Skyraiders, each host naval air station had to maintain the aircraft simulators and a fleet air support squadron (FASRON).[5] The same applied to the aviation supply office at each naval air station. For instrument training, pilots often had to be sent away to other stations on temporary duty, at great expense in money and time. Thus, for carrier squadrons on the West Coast, services had to be duplicated at NAS (Naval Air Station) Alameda, Miramar, Moffett Field, and North

Island, California, and on the East Coast at NAS Oceana and Norfolk (in Virginia), and Cecil Field, Jacksonville, and Key West (in Florida).[6] Not only did such a system place unneeded demands on test equipment and highly trained maintainers and stretch the spare-parts inventories in the supply system, but it was also expensive and terribly wasteful of manpower and did little to enhance either readiness or safety.

By the late 1950s the situation cried out for some sort of consolidation, and the Navy found models in its own backyard. In World War II, a pilot ordered to an air group would first go through an Advanced Carrier Training Group, where he mastered the plane he would fly before he reached the carrier. In other words, he was combat ready when he reported to his squadron.[7] That process was dropped soon after the war ended, but the idea remained in institutional memory.

As early as May 1952, the commander of the Naval Air Force, Pacific Fleet had established the Fleet Air Gunnery Unit (FAGU) at NAS El Centro, California.[8] Atlantic Fleet squadrons took advantage of FAGU's training some years later, establishing in effect a Navy-wide system of gunnery, bombing, and ordnance-system maintenance.

In the Naval Air Training Command too, instructors were already receiving standardized preparation, in special instructors' schools, before ever taking on a student; one was the Instructors' Basic Training Unit in Pensacola, Florida. In April 1955 the Jet Transitional Training Unit (JTTU) had been established at Olathe, Kansas, to orient erstwhile deskbound pilots to jets.[9]

Even earlier, with the arrival of even more demanding jet aircraft into the fleet, Vice Admiral William Martin, then Commander, Naval Air Force, Pacific Fleet, directed that Commander James D. "Jig Dog" Ramage, commanding officer of Composite Squadron 3 (VC-3) at Moffett Field, establish a transitional training unit there to train both pilots and maintenance personnel in standardized procedures for operating and maintaining the high-performance aircraft then entering the fleet. Project CHECKOUT (then colloquially "Cougar College") was organized to train for the swept-wing F9F-6 and later the FJ-4; it was combined later with Project CUTLASS to set up training for the F7U.[10] Training for the Douglas A-4D Skyhawk, the Demon, and the Skyray followed.[11]

With these examples before them, it was easy for planners to visualize the establishment of replacement training squadrons, starting with replacement training air groups—or "RAGs," as they have long been called—and leading ultimately to the graduate training program we know today as the RAG system.

A catalyst for a replacement training program may have been an 18 December 1957 letter from Vice Admiral Robert Goldthwaite, then Chief of Naval Air Training (CNATRA), to Vice Admiral William V. Davis, Jr., the Deputy Chief of Naval Operations (Air Warfare)—that is, "Op-05." The letter compared the

introduction by the U.S. Air Force of its "Century Series" fighters, with its program of carefully organized training, and the Navy's much worse experience with relatively unsupervised checkout in its own new jets. He went on to suggest that the CNATRA-supervised training at the JTTU, in Olathe, might be a model for the Navy. Further, he suggested that the issue be put on the agenda for a General Aviation Training Conference to be held the following February.

Whether Admiral Goldthwaite's suggested discussion made the agenda or not is unknown, but on 10 March 1958 the Chief of Naval Operations approved

> a reorganization of carrier aviation that would create uniform air groups, provide a more permanent group assignment to ships, and permit a reduction of assigned units and aircraft without also reducing combat readiness. The new organization also provided for a permanent replacement Air Group to be established on each coast and made responsible for the indoctrination of key maintenance personnel, the tactical training of aviators, and conducting special programs required for the introduction of new models of combat aircraft.[12]

Hand in hand with the RAG approach, the Navy instituted what was then known as the "base loading" system. Basically, all aircraft of a given type were now consolidated at one station on each coast, colocated with the RAG for that type, thereby facilitating instrument, simulator, and maintenance training, as well as intermediate maintenance and supply. It also did wonders for tactics, as pilots met, passed the word, and discussed the best way to carry out missions —sometimes in semiformal classrooms, sometimes at "Happy Hours" at officers' clubs.

About a year later, in May 1959, FASRONs were disestablished. Maintenance devolved to units having custody of aircraft, although new aircraft intermediate maintenance departments on carriers and at naval air stations assumed the FASRONs' former role.[13]

The first two replacement air groups were regular carrier air groups, one from each coast, redesignated in 1958 as RAGs and given new missions.[14] One, CVG-4, sometimes called "CAG-4," was renamed RCVG-4 and based at NAS Cecil Field for East Coast carrier squadrons.[15] The other, CVG-12 (or "CAG-12"), at NAS Miramar, became the West Coast training group.[16] Later, in April 1962, to bring their generic titles in line with their functions, RAGs were categorized as "combat readiness air groups" (CRAGs)—though they were still referred to individually as RCVGs (e.g., RCVG-4).[17] Many of the squadrons assigned to them retained their original names and numbers, but the RCVGs eventually absorbed a mixture of squadrons and aircraft types, with new training missions. RAG squadrons dedicated to instrument training were also established to train and refresh pilots in instrument work, using two-place aircraft,

and to administer the required written examinations. Early on, FAGU was absorbed into the RAGs. At the outset, though the RCVG commanders and their staffs were in Cecil Field and Miramar, their squadrons were distributed among Oceana, Jacksonville, Cecil Field, and Key West on the East Coast and Alameda, Moffett Field, and Miramar on the west. On the Marine Corps side, Marine Training Squadron 1 (VMT-1) was established at Marine Corps Air Station (MCAS) Cherry Point, North Carolina, in July 1958, with a three-element curriculum: a Swept-Wing Jet Transitional and Refresher Course and two instrument courses. There was a similar organization at MCAS El Toro, California, for West Coast Marines. Later, replacement patrol air wings were established, especially important as the maritime patrol (VP) community began its transition to the P-3 Orion aircraft. Sometime later, RAGs were established on both coasts for heavy attack, reconnaissance attack, airborne early warning (the E-1 Tracer and E-2 Hawkeye), and helicopters. Today we have RAGs for each major type of aircraft and mission in the inventory. Still later, the two RCVG commanders and staffs were seen as redundant and replaced by other supervisory organizations.

RAGs not only familiarized and trained newly reported pilots, and soon naval flight officers (or NFOs, specializing in weapon and sensor systems), in the systems and flight characteristics of their new aircraft but also trained enlisted maintenance personnel in the particulars of their aircraft. The latter took the place of the former on-the-job training provided recent graduates of specialized technical training activities (known as "A" and "B" schools) by fleet squadrons and FASRONs, thus simultaneously improving maintenance readiness and reducing costs.

Most importantly, the RAGs had a tremendously positive influence on accident prevention.

> July 1959 marked the end of the first year of Replacement Carrier Air Group operation. RCVG-trained pilots represented 28 percent of the average number of fleet pilots flying A4D, F4D, F11F, F3H, FJ-4 and F8U aircraft during fiscal year 1959.
>
> A study of their safety record as opposed to squadron trained pilots showed only 1 in 24 RCVG trained pilots were involved in a pilot factor accident as contrasted to 1 in 9 for squadron trained pilots.
>
> The RCVG program was estimated to have saved the Navy approximately 40 million dollars to date [1959].[18]

## LEVEL READINESS

RAGs also facilitated readiness. Previously, as noted, squadrons would reconstitute between deployments. The more experienced pilots would depart for other duty soon after a cruise, to be replaced by a combination of pilots from shore

duty and "nuggets" directly from the training command. It was up to the squadron leadership to mold this new group into a cohesive and talented fighting unit. As expected, results were mixed, depending almost solely on the leadership (or lack of it) of the commanding officer, executive officer, and operations officer. "Level readiness" was a response to this unevenness: the RAG would train the replacement pilots, and later NFOs, making them ready to blend in with any squadron flying similar aircraft without any further indoctrination. Squadrons would not be totally reconstituted between cruises but have individuals rotate in and out in accordance with optimum career planning and the needs of the service. The theory was that every two months, each fleet squadron, regardless of where it might be in a deployment cycle, would lose one full-tour pilot and gain a replacement pilot of equivalent rank. In this way the squadron would maintain continually its level of combat readiness.[19]

The Atlantic Fleet adopted the practice of level readiness, but the Pacific Fleet did not, and even in the Atlantic Fleet not everyone was happy with the arrangement. Among other things, there was suspicion that it was simply a scheme concocted by the Bureau of Naval Personnel to stretch limited personnel resources. Squadron commanding officers objected to losing experienced pilots in the middle of a deployment, to be replaced by unknown quantities.[20] Some years later the level-readiness concept was somewhat modified to enable squadrons about to deploy to work up as units with all personnel on board. Yet level readiness paid off any number of times, even in the Pacific Fleet, when an individual lost to accident or in combat had to be replaced on short notice and the RAG system was able to do that.

## NATOPS

As the RAGs got started, familiar questions about what the best way was to do certain things emerged with new urgency. At first, as had been the case in squadrons before RAGs, operations officers or commanding officers of RAG squadrons dictated as they thought best. Soon, however, after a few exchanges between coasts, it became obvious that there had to be one best way. Thus came the first glimmers of standardization. Eventually they led to what is known today as NATOPS, Naval Aviation Training and Operations Procedures Standardization. How that happened and why is quite a story.

In 2010 a retired Marine aviator recalled how it had been before NATOPS —in his case, in 1956.

> What the flying did not include in those days was a fully-fledged standardization program and a mature Naval Aviation Safety program. The result, predictably obvious by today's standards, was a horrific accident rate.[21] You see, the folks who led us back then were all wily, steely-eyed veterans of World War II and Korea and knew no fear.

> They trained us the same way they had been trained—by launching us into the hostile sky largely unsupervised with the hope that the more promising among us would return alive. Surprisingly, some of us did. It was a training system Charles Darwin would have been proud of.[22]

While the remark about merely hoping that "nuggets" would stay alive might be an exaggeration, it is true that there was little supervision. Orientation to fleet aircraft often consisted of a reading of the handbook, a blindfold cockpit check, a brief on how to start the engine, and a "good luck." More than one novice was told something like, "Meet me over the San Mateo Bridge at 5,000 feet," only to find that the rendezvous was for an air-to-air test of his skill and mettle.

Not all was chaos before NATOPS, however. Standardization was the rule in many aspects of Naval Aviation. In the training command, students preflighted, started, taxied, and flew their training aircraft in standard ways. Takeoff procedures, landing approach patterns, and flight procedures—including a variety of maneuvers, both acrobatic and nonacrobatic—were performed according to strict standards. Flight grades were predicated on those standards. Instructors, as we have seen, were prepared in standardized ways.

Then there was instrument flight training, but before 1950, not all Naval Aviators were qualified to fly on instruments, only those with special training. Everyone else flew according to visual flight rules. With increased emphasis on flying at night and growing need for flying near high-traffic metropolitan areas and in airways, the Chief of Naval Operations directed that instrument flight boards be established at each squadron, air group, and station and that by the middle of 1952 all Naval Aviators have and maintain valid instrument ratings.[23] That, of course, required increased training in instrument flying and airways procedures, which was in itself a kind of standardization. Much of that learning and subsequent practice was codified in the *All-Weather Flight Manual,* a sort of precursor to NATOPS for flying at night and in bad weather on instruments.

Meanwhile, in the training command and in the fleet, takeoff and landing patterns had long been standardized. Air Force, Navy, and Marine pilots flew identical patterns at airfields, and all aircraft carriers had the same launch and landing pattern. In fact, there was a United States Fleet directive, and later a Naval Warfare Publication (NWP), that stipulated the patterns. Also, in the fleet, each organization had a standard operating procedure (SOP), important if for no other reason than it was on the checklist for every administrative inspection.

The problem was that even if the squadron followed it, the SOP changed every time the commanding officer or the operations officer changed. At the same time, lurking in the background and impeding progress toward standardization generally, was the question, "Why standardize and shut down initiative?" It

seemed to one observer at the time, "Some people view the idea of everyone in Naval Aviation doing everything, 'the one best way' with some misgivings. They fear that general use of standardized procedures, while it may reduce the accident rate, will result in a reduction of a pilot's ability 'to think on his feet' and deal flexibly with emergencies and combat situations."[24]

That is, standardization was not necessarily looked upon as a safety factor. After all, all the Navy's propeller-driven aircraft were so similar in cockpit configuration that an experienced pilot could easily step from one type to another without any special training, and many did. Even going from single-engine to multiengine was not especially hard. Every cockpit had a stick (or a yoke), a throttle (or two or four), propeller and mixture control(s), magneto switches, perhaps a supercharger lever, flaps, and landing-gear controls. All these were in similar positions in every aircraft; the only thing an experienced pilot needed to learn to fly a new airplane was how to start it and what airspeeds were recommended for maneuvers and landing. Tactics varied from fighters to bombers to patrol and transport, but that did not matter to people who cared only about the flying. Then came the jets.

The first jets were not much different from reciprocating-engine, propeller-driven aircraft. Of course, the takeoff roll was longer, engine response to throttle movement was quite a bit more sluggish, fuel was used up a lot quicker, and there was less time to correct a bad landing approach, but then, that messy throttle quadrant—with mixture, prop, and supercharger levers—was gone, and there were no magnetos. Problems began to develop only when older pilots tried flying jets with habits they had picked up in "props," jets began flying from ships, and even-higher-performance jets, with new capabilities, came along. It was then, with fleet accident rates at a new high, that perceptive leaders recognized that something had to be done.

It was natural to look to examples already established—JTTU, "Cougar College," FAGU, and others. Thus even before NATOPS there was a framework for establishing a methodology to ensure that newly indoctrinated pilots were exposed to the best possible training and procedures, training and procedures that would improve the mishap performance, and therefore readiness, of all fleet aircraft.

Still, the Pacific Fleet, the Atlantic Fleet, and the Naval Air Training Command all had different ideas as to what the best system might be. One example, perhaps apocryphal, was that A-4 pilots from one fleet made approaches with speed brakes out, in the other with speed brakes in. There was a difference of opinion as to the best way to recover from a poststall gyration in an F7U Cutlass. Still other differences abounded as well. At that point Vice Admiral Robert Pirie, USN, Deputy Chief of Naval Operations (Air Warfare)—that is, DCNO (Air),

Op-05—stepped in. Sources vary as to what caused him to act, but act he did, setting the tone for what NATOPS is today: a manual for the users.[25]

First, he made the basic decision that there must be one best way to, say, make an approach in an A-4, recover from a Cutlass poststall gyration, or whatever the case might be. He put a team together to find, for each situation, that best way. Second, he had to choose between letting his staff, all experienced aviators, decide the best way and asking the fleet—that is, the current users of the aircraft. He came down on the side of the current users: they would be the subject-matter experts, they would write what became NATOPS, and they continue to write and modify it to this day. Naval Aviators who were actually flying the aircraft in the fleet, lieutenants and lieutenant commanders, wrote the books, using as a guide a June 1961 Naval Training Device Center publication, *Improvement of Flight Handbooks.* Agreement had to be reached from squadron to squadron and fleet to fleet and up the chain of command before any NATOPS manual was approved. Approval came via wing commanders and type commanders (to DCNO [Air]);[26] only after that entire command chain approved did Admiral Pirie and his successors put their signatures to each volume. The end result was a manual that stipulated the best method of performing every function in a given aircraft, thus contributing to safe and efficient flight operations.

All NATOPS manuals were similar in format. Each had eight chapters: "Indoctrination," "Shore-Based Procedures," "Carrier-Based Procedures," "Flight Procedures," "Emergency Procedures," "Communications," "Special Mission," and "Miscellaneous." Over the long term, the introductions were probably most important, because they invited every reader and every user to recommend changes and modifications. All such inputs were reviewed, and all were considered, and they still are. Thus, through an iterative process, the best procedures and practices were distilled, combat readiness and operational effectiveness were significantly raised, and aircraft accident rates were significantly reduced. One very experienced Naval Aviator would write, "[NATOPS] is designed as a means of providing the best and safest aircraft training and operating procedures in an easy to use manual for each type of plane we fly, to enable such a manual to be attentive to the needs of the operating forces, and to provide a training tool for Squadron Commanders' use in determining areas of weakness in his training program or in an individual."[27]

In May 1961 the NATOPS program was adopted and made authoritative by the Chief of Naval Operations, through the promulgation of OpNav Instruction 3510.9, a series still effective today. Of course, manuals for every aircraft type did not spring up the day the instruction was signed; it took a great deal of work and coordination to bring out each one. The helicopter community, with its Sikorsky HSS-1N Seabat (later the SH-34) NATOPS, was first "out of the chocks," that

very same May 1961. Other aircraft types soon followed, and within the year manuals for forty-seven aircraft had been issued. It was as if everyone had thought, "It's about time!" Gone were arguments with newly arrived operations officers about the "right way." Down went the mishap rate. Almost everyone pronounced NATOPS to be "good," though diehards continued to grumble about lost opportunities for initiative.

NATOPS continued to develop, of course. In the beginning, NATOPS was just one of a trilogy of books to be used by Naval Aviators. There were still the *Flight Manual,* which had long been around and covered the mechanics of the airplane —the "systems," in today's vernacular; the NWP series, which addressed tactics; and now NATOPS, covering techniques. In December 1963 an F9F-8T (two-seat Cougar trainer) manual appeared, consolidating all three; handbook information with flight and operating procedures was promulgated. Although its covers were not blue at first, the "Blue Sleeping Pill" had been born.[28] More—many more—editions were to follow. (There were also, of course, manuals and technical orders, to which, though they were kept in maintenance spaces, pilots seeking answers to special problems often referred.) Frequent and regular NATOPS conferences under the auspices of the air type commanders helped to keep the manuals current and useful. One of the best summaries of NATOPS available was published in the August 1961 issue of *Approach,* the Naval Safety Center's universally read aviation safety magazine: "The new NATOPS program was developed by the users for the users. It will be modified as we go along by these same individuals. New tricks of the trade will be passed around quickly for expert evaluation and, if sound, for use by all hands. The end result will be increased operational readiness through increased safety brought about by improved pilot techniques."

An interesting and important milestone on the road to adoption of NATOPS was cooperation among all the many Navy aviation communities, among fleets, and with the Air Force. The latter cooperation in particular was remarkable, in that most Navy people are reluctant to learn anything from their brethren in light blue. Nevertheless, the Air Force had operated a standardization and evaluation ("Stan/Eval") program for many years, and the first Navy standardization evaluators actually took the Air Force course, learned that service's philosophy and methodology, and brought them back to the Navy, albeit somewhat modified. Along with the NATOPS manual came the aforementioned standardization instructors and evaluators, who visited squadrons to make sure that their normal flight and emergency procedures were in conformance, systems knowledge was adequate, and more. The NATOPS framework was implemented quickly, but its scope broadened gradually, until, type by aircraft type and unit by unit, it was incorporated in every Navy and Marine squadron and wing, afloat and

ashore. Later, the system was expanded to landing signal officers and aircraft carriers and other aviation ships. NATOPS is used as a teaching guide in ground school and as a guide for both standard and emergency procedures in simulators, in trainers, and in the air. It is also the common denominator for readiness across fleets, type commanders, ships, and stations.

Today it would be hard to conceive of aviation in the Navy without replacement air groups and Naval Aviation Training and Operations Procedures Standardization, but in the beginning it was equally hard to conceive that Naval Aviation could have standardized to such an extent without destroying the spirit of innovation that in fact persists until this day. Nor could it have been conceived that, thanks largely to farseeing souls who believed that dedicated training and standardization just might help, the Navy-wide mishap rate could be improved from 1,106 major accidents, 613 destroyed aircraft, and 358 people killed the year before RAGs were first begun and NATOPS was first considered to only eleven major mishaps in 2009. At the same time it is hard to detect any decrease in either individual or squadron initiative.

Very often, when old-timers are told that today's accident rate is only about one every hundred thousand flying hours, they are at first incredulous. Then they ask, "How? What made the difference?" The answer might be better leadership, better selection, better personnel management, improved integration of aviation medicine, better aircraft and systems, better maintenance and supply, angled decks and landing-approach mirrors on carriers, the replacement training concept, or NATOPS.[29] The answer is not singular, all these helped—but central among the reasons are most certainly the adoption of the RAG concept and the implementation and effective use of NATOPS.

These were indeed six amazing years.

NOTES

1. The Vought F8U Crusader, McDonnell F3H Demon, Douglas F4D Skyray, Grumman F11F Tiger, McDonnell F4H Phantom, North American A5A (later RA-5C) Vigilante, and the Douglas A3D Skywarrior.
2. In order to fill out the decks of aircraft carriers mobilized during the Korean War, "air task groups" were formed, taking one squadron from each of several already formed air groups. For example, Air Task Group 1 consisted of VF-111 from Air Group 11, VF-52 from Air Group 5, VF-151 from Air Group 15, and VF-194 from Air Group 19.
3. Customarily each air group took with it on deployment detachments of aircraft and personnel for photo reconnaissance, airborne early warning, and night and all-weather attack, as well as helicopters.
4. One perhaps extreme example of the difficulties attendant to such an arrangement comes from the author's first cruise. The ship had been to sea about six weeks when a strange

commander came into the ready room, looked around, and left. All looked at one another and asked, "Who was that?" It turned out to have been the air group commander.

5. The FASRON was the intermediate level of maintenance between overhaul and repair depots staffed mostly by long-term Navy civilians and the organizational level staffed by sailors in each squadron. The FASRON was manned by both permanent–duty station Navy personnel and specialists on temporary duty from parent squadrons. When the squadron deployed its FASRON-assigned personnel would rejoin the squadron. The FASRON owned difficult-to-transport test equipment and repair benches, expensive spares, and, often, spare aircraft.
6. Marines apparently had fewer problems, being based primarily at Cherry Point, North Carolina, and El Toro, California.
7. "A Revolution in Readiness," *Naval Aviation News,* January 1959, pp. 7–11.
8. A six-week course at El Centro for Navy and Marine fighter and attack squadrons was meant to establish a cadre of excellence in ordnance and gunnery within each squadron. Established initially for West Coast squadrons, it expanded later to offer training to those on the East Coast as well.
9. Roy A. Grossnick, *United States Naval Aviation, 1910–1995* (Washington, D.C.: Naval Historical Center, 1997), p. 206.
10. "Supersonic Checkout," *Naval Aviation News,* April 1955, pp. 1–5.
11. "Crusader College Carries On," *Naval Aviation News,* June 1958, pp. 22–23. VF(AW)-3, formerly VC-3, had actually operated as a transitional training unit since 1954. Initially it was a small unit at Moffett Field, California, operating under the aegis of the Naval Air Test Center as an adjunct to a fleet indoctrination program for new aircraft. At first, four pilots from each transitioning squadron completed a forty-hour flight syllabus at VF(AW)-3 in all phases of flight. Later a cadre of enlisted maintenance people was added, the idea being that, for each squadron, the four pilots and the small group of maintainers would form the core of a training effort. Ramage took command in 1955 just as the squadron began training with the Cutlass.
12. Grossnick, *United States Naval Aviation, 1910–1995* (as republished in Roy A. Grossnick, *Dictionary of American Naval Aviation Squadrons* [Washington, D.C.: Naval Historical Center, 1997], vol. 2, CD-ROM).
13. Grossnick, *Dictionary of American Naval Aviation Squadrons.*
14. For the Atlantic Fleet, the mission of Carrier Air Group 4 was defined as the indoctrination, familiarization, and basic training of Naval Aviators and key maintenance personnel, as well as the establishment of fleet introduction programs for new models of carrier combat aircraft. For Pacific Fleet squadrons, the mission was to provide indoctrination and flight training to fleet replacement pilots, as well as indoctrination and on-the-job training for replacement enlisted personnel.
15. The original RCVG-4 squadrons were VF-101, VF-174, VF-21, VA-44, and VF-22.
16. The original RCVG-12 squadrons were VF-121, VF-124, VA-125, and VA-126.
17. Grossnick, *Dictionary of American Naval Aviation Squadrons.*
18. *Approach,* August 1959. Referring to the A4D (later A-4D) Skyhawk.
19. Capt. R. G. Dosé, USN, "Professional Note: The Replacement Air Group Concept," U.S. Naval Institute *Proceedings* (April 1960), pp. 135–38.
20. Donald D. Engen, *Wings and Warriors: My Life as a Naval Aviator* (Washington, D.C.: Smithsonian Institution, 1997), pp. 236–37.
21. The fiscal year 1956 Navy-Marine accident rate was 33.5 major accidents for each hundred thousand hours flown, with 574 aircraft destroyed and 406 people killed.
22. Col. William T. Hewes, USMC (Ret.), "The High Dive," Naval Aviation Museum *Foundation* 31, no. 1 (Spring 2010), p. 96. For another look at generally the same experience, see Robert C. Rubel, "The U.S. Navy's Transition to Jets," *Naval War College Review* 63, no. 2 (Spring 2010), pp. 49–59.
23. Grossnick, *United States Naval Aviation, 1910–1995,* p. 188.

24. "The One Best Way: A New Standard for Navy Air," *Naval Aviation News,* August 1961, p. 6, available at www.history.navy.mil/.

25. In his *Aircraft Carriers at War* (Annapolis, Md.: Naval Institute Press, 2007), Adm. James L. Holloway III, who had been executive assistant to Vice Admiral Pirie, gives his version (pp. 149–51). Vice Adm. Donald Engen, an air wing commander at the time of NATOPS introduction, gives a different view in his *Wings and Warriors,* p. 245.

26. Air wing commanders oversee the training, manning, maintenance, and administration of groups of squadrons of mixed types that, at least ideally, embark together on aircraft carriers. Type commanders performed the same functions for all naval aircraft in the Atlantic or Pacific Fleet (today combined in one headquarters in San Diego, California).

27. *Approach,* October 1962; quoting Captain R. J. Selmer, Commander, Fleet Air, Alameda, California.

28. Today's manuals are thick volumes, some even produced in more that one volume for a single aircraft type, but all characterized by blue covers. There is so much material that anyone attempting to read the whole book from cover to cover in one sitting would be prone to falling asleep—thus, "Blue Sleeping Pill."

29. For the introduction of the angled flight deck and mirror landing aid, see Thomas C. Hone, Norman Friedman, and Mark C. Mandeles, "The Development of the Angled-Deck Aircraft Carrier: Innovation and Adaptation," *Naval War College Review* 64, no. 2 (Spring 2011), pp. 63–78, available at www.usnwc.edu/press/.

# WHY WARGAMING WORKS

*Peter P. Perla and ED McGrady*

Wargaming has a long history as an important tool for military training, education, and research.[1] In its broader application to nonmilitary conflict situations (see, for example, the recent books *Wargaming for Leaders* and *Business War Games*), the technique is increasing in popularity, particularly among businesses seeking strategic advantages.[2] (As a result, we will sometimes use the terms "wargaming" and "gaming" interchangeably; in the latter case, however, we mean what is called "serious gaming," not the more general sense, like gambling.)[3] Despite that history and popularity, however, wargaming's record of success is uneven. Some games seem to succeed very well in preparing important decision makers for real-world environments in which they later find themselves. A prime example is the U.S. Navy's series of games during the 1920s and 1930s, which helped train the commanders who won the Second World War in the Pacific. Other games do not do so well; for example, the game played by the Federal Emergency Management Agency in July 2004 did not seem to help that agency respond effectively to Hurricane Katrina's landfall only two years later.

The reasons for the successes and failures of wargames of all types are as varied as the games themselves. Sometimes success stems from particular circumstances of subject matter and participants; sometimes failure flows from poor design or faulty facts. When it works, wargaming can appear almost magical in its power to inform and instruct; when it

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*Naval War College Review, Summer 2011, Vol. 64, No. 3*

doesn't work, it can appear almost childish in its oversimplifications and abstractions.

We believe that wargaming's power and success (as well as its danger) derive from its ability to enable individual participants to transform themselves by making them more open to internalizing their experiences in a game—for good or ill. The particulars of individual wargames are important to their relative success, yet there is an undercurrent of something less tangible than facts or models that affects fundamentally the ability of a wargame to transform its participants.

This article explores that undercurrent. We characterize it in terms of the relationships among wargaming (in its broadest sense), narrative storytelling, and the inner workings of the human brain. We propose the idea that gaming's transformative power grows out of its particular connections to storytelling; we find in a combination of elements from traditional narrative theory and contemporary neuroscience the germ of our thesis—that gaming, as a story-*living* experience, engages the human brain, and hence the human being participating in a game, in ways more akin to real-life experience than to reading a novel or watching a video. By creating for its participants a synthetic experience, gaming gives them palpable and powerful insights that help them prepare better for dealing with complex and uncertain situations in the future. We contend that the use of gaming to transform individual participants—in particular, key decision makers—is an important, indeed essential, source of successful organizational and societal adaptation to that uncertain future.

We find inspiration and support for this position in an intriguing book by the German psychologist Dietrich Dörner, *The Logic of Failure*.[4] In this work, Dörner argues that "geniuses are geniuses by birth, whereas the wise gain their wisdom through experience. And it seems to me that the ability to deal with problems *in the most appropriate way* is the hallmark of wisdom rather than genius."[5] In simplest terms, Dörner believes that we need to "learn to deal with different situations that place different demands on us. And we can teach this skill, too—by putting people into one situation, then into another, and discussing with them their behavior and, most important, their mistakes. The real world gives us no chance to do this." But games do. The need to explore, repeat, and reflect on decisions made in the context of games is critical to what we must do to learn better how to cope with a world rapidly moving beyond our range of real experiences. Improving the ability of our games to help us do this, in turn, demands that we improve our understanding of why wargaming works.

## NARRATIVE AND GAMING

We begin our exploration by considering the relationships between narrative and gaming. Throughout human history, narrative—storytelling—has been a

fundamental way to understand events we did not or cannot experience. Narratives take many forms, but the best ones succeed in placing those who experience them into the flow of events and activities they describe. A suspension of disbelief occurs as readers, watchers, or listeners experience the vicarious emotions and actions brought out by the narrative. Exploring this idea further, we will discuss research—literary, psychological, and neurological—that has illuminated the processes by which this suspension of disbelief occurs.

Games are participatory narrative experiences. There are many different types of games, from the board games of our childhood to modern computer and online games, and to that mainstay of military games, the tabletop or seminar game (or even the derisively named BOGSAT—Bunch of Guys Sitting around the Table).[6] Although this article applies to games in general, much of our default perspective derives from this latter class of games, so familiar to the denizens of McCarty Little Hall, in Newport. At their most intense level, which we call "high-engagement games," games draw players into both participating in and constructing their narratives; they literally place the players inside the narratives. In fact, gaming is an even more powerful way to experience narrative than reading a book or watching a film. Like literature and film, high-engagement games give players a taste of the emotional and empathetic challenges they may face during situations like those presented in the game. Unlike literature and film, games give players active responsibility for their decisions, similar to what they would experience in the real world, and force them to bear many of the same consequences of those decisions, both positive and negative.

Those consequences include not only the physical changes to the decision-making environment (such as the loss in battle of an important warship) but also the psychological effects of both making those decisions and dealing with their effects. For example, during a large-scale real-world disaster, decision makers will face emotional and psychological stresses as well as operational challenges. Strictly intellectual exercises, including simple, scenario-based planning, seldom create emotional or psychological stress. Indeed, no planning system or training tool can cover every possible contingency or produce the same stresses experienced in reality. Real people do not die in wargames. Nevertheless, effective high-engagement games can equip leaders better to confront whatever contingency they must actually face, regardless of its similarity in detail to the game actually played. Leaders responsible for making crisis decisions and living with their consequences will benefit from the synthetic experience derived from playing high-engagement games—as well as from the additional mental tools they can develop through that experience—to help ready themselves for confronting those challenges. At the very least, these synthetic experiences will help prepare

them to ask the critical questions during planning and preparation for the unpredictable range of possible futures.[7]

***Synthetic Experience through Stories***

Literature and cinema are ways in which nearly everyone has experienced real situations and events synthetically. An example of literature affecting policy is the story of how Richard Preston's novel *The Cobra Event* influenced then-president William Clinton.[8] As Tom Mangold and Jeff Goldberg report in their own book *Plague Wars,* "Ironically, everything that Clinton had previously learned about biological terrorism from official sources did not have as much effect on him as the Preston novel. The book found a curious resonance within Clinton, which led to a profound interest and concern about the threat. Indeed, Clinton was so alarmed by what he read that he asked U.S. intelligence experts to assess the book's credibility."[9]

At about the same time, in March 1998, the White House ran a wargame on biological terrorism. These events combined to cause the president to call a special cabinet meeting on bioterrorism on 10 April 1998. As a result of this meeting, Mangold and Goldberg report, President Clinton asked Congress to add $294 million to the counterterrorism budget.[10]

The dramatization of the narrative in *The Cobra Event* (and the reinforcement of that experience in the game) seemed to access parts of President Clinton's imagination and attention that other sources of information could not. By showing him the consequences, including the political and social dangers, of such an event, the narrative became a powerful warning of what he himself would face in the event of a biological incident.

But what does narrative do that is different from other forms of discourse? After all, plenty of words had been written in the open-source and intelligence literature about the threat of biological weapons before President Clinton read *The Cobra Event.* What makes telling a good story more powerful than other forms of communication?

***The Power of Prose***

To explore this question more fully, we turn now to literary theory. Let's begin by delving into the meaning of prose.

"Prose" is a generic term that can mean any writing that is designed to mimic everyday speech in its rhythms and word choice (i.e., prose is not verse). Prose can be divided further into whether it concerns facts (nonfiction) or is imaginative (fiction). Prose can also be divided according to the mode of writing: exposition, argumentation, description, or narrative. At its most basic level, prose is simply words with meaning that are written on a page or spoken. This literalist, or factual, aspect of prose would mean that the words "he picked up the gun and

shot" both are the actual words and letters (hepickedupthegunandshot) and convey the everyday meaning that we would ascribe to them (the act of obtaining possession of a particular weapon and firing it).

Prose that tells a story (the narrative form) creates meanings that go beyond the effect of simply presenting facts; the narrative forms an image in the reader's mind of the thing being described. Likewise, narrative can cause the reader to react emotionally to the information being presented—to laugh, cry, feel afraid. These emotions are not contained in the facts presented on the page or in the literal meaning of the words. Rather, they are created in the reader's mind by the interaction between the reader and the words on the page. Here the meaning of "he picked up the gun and shot" may invoke a range of emotions or empathetic feelings, depending on its context in the overall story line.

Between the literal presentation of words on the page and the reader's reaction to them, there is a place that does not exist in the real world but that has real effects on the reader's mind. In literary theory this is called the *l'entre deux,* the "between place." It is in this in-between world, where narrative is real and everyday reality has retreated into the deep background, that the reader engages in what we all learned about in high school, the suspension of disbelief. The *l'entre deux* is real for the reader, even if it is nowhere to be found on the page. It is neither on the page nor absent from the world. It is not in the world as constructed in the literal meaning of the words on the page. It is between the real and the unreal, between the reader and the page.

Samuel Taylor Coleridge first used the term "suspension of disbelief" to mean "transfer from our [the author's] inward nature [of] a human interest and a semblance of truth sufficient to procure for these shadows of imagination that willing suspension of disbelief for the moment, which constitutes poetic faith."[11] In other words, the author creates a fantasy or fictional narrative that is sufficiently engaging (the author's responsibility to the reader being itself a major theme of literary theory) to cause the reader to believe in what is not there—that is, to have "poetic faith."

If you parse Coleridge's statement carefully, you will see that the focus is on the author's ability to create the suspension of disbelief. It does not refer to the reader's giving the author the benefit of the doubt, as is sometimes meant when the term is applied to games. Here we use Coleridge's sense, one that places the requirement squarely on the author (or game designer) to affect the reader (or player). All the reader has to do is enter honestly into the narrative; suspension of disbelief will happen if the author has constructed a believable story world populated by believable characters.

There are, in fact, several different ways of looking at suspension of disbelief: from the literary perspective, as a phenomenon created by the author and

entered into by the reader; from the philosophical perspective, understanding what is real and what claim imaginary realities have on being real; from the psychological and cognitive-science perspective, which views thought and belief as interrelated processes of perception and understanding; and, finally, from the neuroscience perspective, where imagination becomes a sequence of neural and perceptive processes that occur, starting with raw perception and leading to belief about the nature of the world. This intersection of literature, philosophy, cognitive science, and neurology gives us a number of independent perspectives on how this phenomenon works and how we should consider it.

*A View from Neuroscience*

Now let's take a step beyond literary theory into the realms of the biological and psychological study of the human brain. Neuroscientists and psychologists studying belief and perception model the suspension of disbelief as a multistep process. When suspension of disbelief occurs, the reader enters into a half-real state where all of the information provided at the time of reading is believed, but upon almost immediate reflection some of it is discounted as fiction.[12] That is, before any higher thought processes are engaged, at the initial moment of perceiving the words on the page readers will believe all of what they read, but upon further consideration they dismiss some of its elements as "fiction" and accept other elements as "real." The process used to determine whether or not we believe what we read is known as the "systematic" system; it is slower to react than the "automatic" system that first processes the work of fiction. What determines the extent to which a narrative or other piece of prose invokes the systematic system and at what intensity is the extent to which we can take real action on the basis of that information.[13] Without the need to take real action, the systematic system may be invoked at a lesser intensity or not invoked at all.

Neurological experiments suggest that this dual process of understanding is at work when we consume any sort of fiction or art. For example, scientists conducted a test with students by giving them two text passages to read. One factually described the process by which George Washington became the first president; the other used dramaturgical techniques to create some uncertainty as to whether he would be elected. Depending on which passage they had read, students had different reaction times to the subsequent question, "Was George Washington the first president?" The students reading the less cut-and-dried passage took longer to answer, even though they "knew perfectly well that in fact George Washington was elected the first president."[14] This suggested to the experimenters that the answer came more slowly due to the lack of clarity in the narrative, which made students believe, even if temporarily or fleetingly, that Washington may not have become president.[15] This effect is called "anomalous

suspense."[16] As we read a narrative we briefly believe both the truth of the world as we know or believe it to be and the untruth that is presented by the narrative. It is only afterward that the slower process of sorting out fact from fiction occurs. That sorting process is driven by our analysis of whether we can or must act on the information presented.

This experiment and its conclusions seem a bit odd, even to us, and it doesn't prove much. It is, however, suggestive and agrees with our own sense of that brief resetting of reality that sometimes occurs after reading a good novel, seeing a great film, or playing a powerful game.

This dependence on the possibility of action is an important component of a neurological understanding of the human mind. Perception and understanding are both tangled up with the problem of acting in the world, because the brain is designed not only to work within itself in some abstract intellectual environment but also to move our whole organism physically through the real world.[17] "Reality checking involves a continual assessment of the relation between behavior and the environment."[18] Thus, while we are suspending our disbelief in a narrative, we are also not yet engaged in the practical process of deciding whether we can use the information we perceive from that narrative to act in the real world. Ultimately we get around to making this decision, even if some of the blurriness of the difference stays with us.

Cognitive-theoretical attempts to distinguish between imagination and belief have constructed a concept similar to the *l'entre deux.* Scientists define a "pretense box," where pretenses (or imaginative flights) are distinguished from beliefs or desires by the function they perform. Pretenses, beliefs, and desires are functionally different, but one hypothesis holds that all three are processed by the same code within the mind, resulting in effects for a pretense similar to those for a belief. The pretense for belief activates our response to a situation, but it is tempered by the separate and contrary pretense that the situation is fictional.[19]

### *Games as Constructed Narrative*

So what does all of the preceding discussion of narrative and cognition have to do with wargaming? Wargames, particularly what we call high-engagement games, extend the imaginative work of art or literature into the physical world and place the participants in control of some portion of the narratives. Players are participants, not merely spectators. As a result, high-engagement games embody two types of narrative: the "presented narrative," which is what we call the written or given narrative, created by the game's designers; and the "constructed narrative," which is developed through the actions, statements, and decisions of the game's participants. The overall game narrative comprises both the presented narrative and the constructed narrative.

The concept of constructed narrative implies that the players are confronted by active choices and that in response to those choices—and consequent to their physical presence in the narrative—they must construct responses to the game's presented narrative. This response is a separate discourse of the players, which merges with the presented narrative of the game to create a synthetic product that is not exclusively that of the players or of the game designers. Players in a high-engagement game not only make choices but also speak and act to explain to other participants their choices—as well as their reactions to the choices of the game designer and the other players. This creates a conversation among everyone involved in the game, one that creates a unique narrative.

In the same way that traditional narratives can invoke emotional or suspenseful responses in their viewers, the narrative arc of a game can invoke a range of emotions in its participants. Players can become excited at the expectation of a significant victory or apprehensive at the possibility that an opponent will exploit a weakness. Likewise, games can present unpleasant information or place players in upsetting situations, resulting in arguments or heated exchanges. These emotions are equivalent to the normal sense of suspension of disbelief, whereby an inanimate and abstract narrative brings about a real-world reaction in the viewers.

As narratives, then, games can create the same reaction as any story. But high-engagement games are more than simple narratives; they employ ranges of physical cues, as do movies or stage plays. The latter rely on visual, auditory, and symbolic cues (cues with social meaning beyond their meanings as everyday objects); a game extends the range of cues to include the physical venue where the game takes place, the control of game play, the physical actions of the players (kinesthetic cues), the social interactions among the players, and dramaturgical effects revolving around those social interactions. These elements are unique to games, and in particular they are most powerfully present in live-action role playing—the quintessential high-engagement games.[20]

***The Venue.*** Although visual and auditory cues from the game designers make up the basis for the game—they are the way the overall scenario and narrative are presented to the players—they in no way make up all of the game. The most basic element of the game experience is the venue, the physical space in which the players act during the game. The venue could be as simple as a tabletop with a map on it or as elaborate as a multimedia, multiroom environment where players interact with each other, with technology, and with a wide range of services during the course of the game. The venue creates among the players and the game controllers spatial and temporal relationships in a way most similar to the role that the physical stage and set play in live theater. These physical

relationships can reflect and help organize hierarchical or communications relationships. The venue also organizes players and their interactions into groupings that depend on the size and layout of the physical area (or perhaps even the computer network) used. One often-overlooked aspect of game design is, in fact, adapting the game concept and design to the physical plant that is available.

***Game Control.*** The aspect of a wargame that is most noticeably different from other narrative forms, including a stage play, is the concept of "control." There are two broad classes of control, which are found in different measure according to the game's design. "Active control" relies on human game controllers, who closely follow player actions and respond to those actions in real time to drive the game forward. "Passive control" relies on a predefined rules set that the players interact with instead of human controllers. In this latter case, computer consoles, game map, or other displays and player aids help the players visualize the game's universe, encode the rules, and spatially organize player actions and options.

***Kinesthetic Cues.*** What is not controlled by the game designers is how the players participate in the world the designers have created and how they interact with each other. Kinesthetic cues occur as players take action and move through space during the game. Cues could be as simple as players walking over to someone to talk, or they could involve actual manipulation of objects, such as miniature representations of the world—for example, maps, telephones, briefing slides, or even physical or conceptual and mathematical models. Unlike the other ways in which the game designer's narrative influences the player's experience, the movement of the players within the game space is (usually) entirely up to the players. The venue and game structure (rules and scenario, for example) can influence how a player acts in a game, but players' actions are ultimately separate, uncontrolled elements of the game, distinct from the presented game narrative.

***Social Interactions.*** The social and cultural interactions that occur in the game create new ways of presenting and changing the narrative experience of the players. The social element of the game affects the way in which players present themselves to the game world and the other players. Because human social perceptions are attuned to understanding the intentions and behavior of people and groups, this self-presentation adds a significant amount of information to the experience.

In a high-engagement game two sets of social relationships are present, those of the real world and those of the game world. These relationships play off one another; often the people experiencing the game have social or organizational

relationships in the real world. These relationships affect the type and nature of acceptable behavior in the game. On the other hand, the game also enables behaviors that might not occur in the real world—because, after all, "it's only a game." This interplay between real-world and game-world relationships can be exploited by the game designer to create a dynamic tension that can allow players to identify and work through real-world organizational conflicts using the mechanism of role playing in the game.

***Dramaturgical Effects.*** Dramaturgical effects are signals that people send in social situations to establish both their identities and the overall social relationship.[21] Business scholarship, in attempting to understand all of the elements that go into organizational relationships and decision making, hypothesizes that within the context of a social situation people do things to present themselves to others in a way that resembles theater more than it does rational organizational processes. An example is the way charismatic leaders treat their subordinates (think of General George S. Patton's famous statement that his staff didn't need to know when he was acting, as long as he did himself) or how they frame themselves as respected in their fields, as intelligent or powerful (think of theme music, such as "Hail to the Chief"). All of the various elements of self-presentation —what you say (scripting), where you say it (staging), how you act (performing), and how you "spin" it (framing)—go into creating the "dramaturgical presence."[22] People's identities, both their views of themselves and how others view them, come from the social interactions they experience. They are not fixed, through some internal function.

In a game, as in real life, players must present themselves to others in such a way as to reinforce the social identities they have constructed. By extension, players also represent or present their parent organizations' identities to others in the context of the game. When required to represent functions different from their normal personae or to embody types of persons different from their normal selves, players face an unusual social situation. Because they know their roles in games are constructed ones, they can enter into them in ways that differ from how they might normally present themselves in real social situations. Likewise, their play in a game is different from performing in a stage play, because on stage the actor is interpreting the script and director's instructions, not (usually) making it all up on the spot.

### *The* l'Entre Deux *of Games*

As a result of those considerations discussed above, the players enter into a game's *l'entre deux* in a way entirely different from the reader's process of suspending disbelief in a traditional narrative. The combination of venue, kinesthetic actions, social interactions, and dramaturgical effects—all moderated and

responded to via active or passive control—allows the players to come closer to entering literally into the world of the game than they ever could in a watched or read narrative. For the game, the *l'entre deux* does, in some ways, actually exist outside of the players' minds—in their actions and their interactions with other players. Because they are dramaturgical actors in the game, the players occupy a "between place" far closer to reality for them than do passive spectators or readers of other narrative forms.

If we consider the cognitive-neuroscience model we discussed previously, the normal narrative disbelief that arises from a reader's inability to act on the information presented in a text narrative is foiled in a game, because the player actually can (and must) act on the narrative information the game presents. Likewise, because they occupy a constructed narrative (the game) as well as constructed dramaturgical identities (their roles in the game), the players need to think as if they are in a real world in order to maintain their game identities —further working against disbelief. In games, then, disbelief is suspended twice, once when the players enter into their roles and again when they use their new (game) identities to construct the game's narrative.

Thus, games can be divided into narrative elements (those things that the designers present to advance the story) and dramaturgical elements (those that require the players to take some action in the real world). Visual, auditory, symbolic, and venue cues form the backbone of the narrative elements in a game; the players construct the rest of the narrative through their kinesthetic actions, their social interactions, and dramaturgical effects. All of this means that players invest in the game more of their own identities—as well as their conceptions of what is real and fictional—than they do in a prosaic narrative. Because of the stronger *l'entre deux* that the players enter during the game, that investment can have a more substantial effect on the participants than would a traditional narrative. The players own the between world, and for them it becomes less fictional and more real.

## GAMING AND REALITY

Games have their rhetorical modes, and, just as other narratives do, games can have effects in the real world. However, a game is also a trick, a sleight of hand that makes the players believe, if only temporarily, that they are someone else doing something else. As with any fictitious narrative, at the end of the game the players will recognize that the events they experienced in it were not real experiences; that the roles they occupied were not their real jobs and lives; and that the narrative they helped create did not happen in the real world. However, any compelling narrative that has affected its readers or viewers emotionally leaves an effect even after the suspended disbelief in the narrative's reality has worn off.

After games, because of their stronger *l'entre deux,* players carry with them even more of the conflict between reality and fiction that the games created. The game's narrative is the player's narrative as much as it is the designer's or the controller's (or the sponsor's). It is created by the players and owned by them, in a joint effort with the designers and controllers.

The *l'entre deux* the players enter through a game's narrative forces them to assume responsibility for the actions and events that occur as a result. It places the consequences of their decisions and actions before the players, and in fact it places those consequences directly on the players. Having to assume responsibility for the consequences of their own actions (as well as of those events beyond their control) gives the players insight about the emotional, psychological, and personal consequences that a real event would have for the actual decision makers whose roles they assumed during the game. The game creates empathy in the players for the roles they are playing, through the suspension of disbelief. Further, because the players are more inclined to see a role-playing game acted in the real world as part of both the *l'entre deux* and the real world, they bring these emotional and psychological states with them back into the real world after the game ends.

Prosaic writing limits itself to accepted signs and meanings in order to convey its facts. Great prose and great games capture meanings that have never been said—meanings that have not yet been recorded as narratives—and make them accessible to readers or players.[23] High-engagement games dealing with speculative or future events capture those new meanings and make them accessible. Those new meanings created within the players and brought with them out of the game—out of the *l'entre deux* and into the real world—affect how the players will act not only during events of the kinds considered in the game but also during any future events they may encounter.

What does this mean? It means that in high-engagement role-playing games we have a powerful tool that can be used to help players learn how better to balance the equation between the cost of preparing for the uncertain future and the risk of not doing so; can help enlighten players about the fact that unexpected and unpredictable events, including embarrassing ones, do happen and that there are real consequences when they do. Without that synthetic experience, it's all too easy to dismiss the most challenging of possible events, particularly when the conventional wisdom presumes that it is simply not worth the cost of preparing for the emotional, psychological, and cultural consequences of contingencies so unlikely. When players have experienced both the personal and organizational costs of such Black Swan events—if only during a game—they develop new perspectives on them.[24] Probabilities affect budgets and lines of authority; consequences affect emotions, relationships, and values.

High-engagement games mask the pressures of the former and so give the players unique opportunities to experience the challenges of the latter.

## CAUTIONS

Of course, wise practitioners must be as cautious when using high-engagement games as must be any wise user of power tools. Games can use the power of narrative persuasion to manipulate players into false beliefs and assumptions in any number of ways. For that reason, game designers have a responsibility to avoid many of the common mistakes that organizations make when they consider future challenges. These errors include both presenting mistaken information or under- or overstating the dangers involved in these events (i.e., just getting it wrong) and also what we call "the sanitary fantasy"—assuming that nothing can ever possibly go wrong and no one will ever misbehave.

### *Just Getting It Wrong*

Games that make this error embed the players in a narrative that creates a false impression about the danger and consequences of a future event or situation. This can cut either way—minimizing the consequences or exaggerating them beyond what is reasonable. In both cases the game has lied to the players, which will result either in their learning incorrect lessons or in their disbelieving the outcomes and recommendations that flow from the game—even the most reasonable and applicable ones, least affected by the lies.

A good example of just getting it wrong is the *Dark Winter* game. *Dark Winter* was a high-level decision-making game about smallpox response held from 22 to 23 June 2001 by the Johns Hopkins Center for Civilian Biodefense Strategies and the Center for Strategic and International Studies. The game involved many people who at one time or another in their careers actually would have been involved in a response to smallpox. They included former governors, senior leaders of the public health and homeland security communities, and a former senator, Sam Nunn, playing the role of president of the United States. The game got it wrong in positing a 1:10 transmission rate for smallpox, a very large incidence that would result in a widespread and virtually unstoppable catastrophe.[25] Of course, using too low a rate might have produced an equally exaggerated result in the other direction.

Given that games such as these affect the emotional and psychological relationship of the players with the subject matter, it could be argued that a more emotionally compelling but less physically severe outbreak could have created similar stresses on the players without overestimating the physical threat of the disease. For example, the victim population could have been smaller but more emotionally affecting, such as immuno-compromised individuals or pregnant women. Or the threat of the unknown, represented by only one or two cases,

could have been played against the players' imaginations, letting them feel the impending doom of a worst-case scenario but without predicting large numbers of downstream casualties.

The exercise received considerable official and media attention at the time, reflecting the emotional reactions that many of the senior-level participants had to confronting a serious disease outbreak that they had little or no capability to stop. Senator Nunn's testimony is interesting in his use of emotional language; for example, referring to the two days of play by the team representing the National Security Council, he stated, "I will skip the agonizing details. . . . [O]ur NSC 'war gamers' dealt with three weeks of simulated shock, stress, and horror."[26] However, the exercise also received considerable criticism for overstating the danger and for presenting a biological attack as an apocalyptic threat that could be overcome only by herculean effort.[27] Even more disturbing, some of the assumptions made in *Dark Winter* have been applied to other biological agents in other exercises.[28] In his testimony before Congress after the game, Senator Nunn stated, "I determined from our wargame that public health has become a national security issue, but that we are unprepared. . . . The members of our simulated NSC, as well as state and local officials, were desperate." Creating such desperation testified to the power of the gaming narrative; in this case, however, doing so by overstating the physical transmissibility of the disease illustrated how easily wrong (or at least questionable) facts can skew the experience in ways that can distort the insights the game creates.

***The Sanitary Fantasy***

The sanitary fantasy is much more difficult to detect (and so to correct) than simply getting it wrong. It is not about what is included in the game but rather what is left out. The effect can be illustrated by a quick example: design a game to capture the strategic decisions faced by the United States over the course of the war in Iraq. Elements such as the challenges of building an alliance, the ability to engage and destroy insurgents, and the restoration of services to the population all would be obvious pieces to include in the design.

But there is a Black Swan, one that circles above the design of any game of modern irregular conflict. How do you deal with those things you cannot expect or anticipate, because they are so at odds with how you see the world that you cannot possibly, either emotionally or politically, imagine their happening? Things that violate your fundamental worldview, like Abu Ghraib?[29] If it does not include factors like Abu Ghraib, and its subsequent effect on how the United States was viewed in the Arab world, it is unlikely that any game architecture could present an effective, realistic scenario, particularly on the emotional and political levels. Military wargames can sometimes reduce the likelihood of such

failures by incorporating freely acting adversaries (Red teams). But even expert military Red teams are slaves to their own worldviews—and all players are subject to the sometimes insidious preconceptions of the controllers and assessors. If Black Swans are truly unpredictable, much of that unpredictability literally is due to the inability of people to imagine what is to them the unimaginable.

Contingencies like the abhorrent behavior at Abu Ghraib or the confusion of the federal response to Hurricane Katrina, and the resulting, respective media firestorms, are Black Swans—unpredictable because they exist in a realm of possibilities where we do not want to go or where our cultures, life experiences, imaginations, and worldviews block us from going.[30] They are examples of the unsanitary and unsavory set of problems that reflect badly on us, on those who are designing and playing the games. Whether it's our weapons systems not working as promised, our contractors going over budget or time limits, or our colleagues advancing their individual agendas at the expense of the overall organization, we too often don't want to admit that such things happen. But they do. And they often become the very things that decision makers have the hardest time grappling with.

## SO WHERE DID WE END UP?

Wargames are synthetic experiences; to make the most of them, we need to integrate them with all the other tools (analysis, exercises, history, real-world experience) that we have available to help us make sense of what we can and should do in the present and the future.[31] Wargames derive their power (for good or ill) from their nature as constructed narrative; they have a more powerful effect on participants than do other narrative forms, because their participants not only are spectators but must act, engaging parts of their intellect and emotions not accessed during simple storytelling. Games are story-living experiences. By engaging their players in ways more similar to acting in the real world than reading a novel or watching a film can be, games affect their players in ways more deeply remembered and more transformative of their personae than other techniques for entertainment and learning. As a result, wargaming, gaming, serious gaming —whatever we call it—is a powerful tool for affecting how people think, feel, and behave.

In military environments, wargames have been important for at least two centuries. In nonmilitary environments they have become more important and more widely applied over the past fifty years. They offer us a promising means to prepare decision makers for the complex and uncertain environments that the pace and depth of change in global dynamics are driving, at ever more breathtaking speeds and in ever more surprising directions.

To deal effectively with the Black Swans lurking in our future—including those unsanitary ones that too often drive the most serious effects of events but that we prefer not to think about—our leaders need to develop synthetic experience, best available to them through such games. Those games need to move away from our traditional approach to dealing with the uncertainties of the future by trying to predict events based on assessment of relative probabilities. Instead, we need to focus on exploring events on the basis of their relative consequences, less to prepare for specific consequences than to prepare our human decision-making apparatus for the physical, intellectual, and emotional environments—full of complexity and uncertainty as they will be—in which our leaders will have to decide, whatever specific events they confront.[32]

Games can do that, but only if their designers and those who sponsor and fund them reverse their own internal priorities about what is important (stressing tangible consequences rather than abstract probabilities) and what is true (human reality rather than bureaucratic convenience). Games are powerful tools that can create synthetic experiences even more powerful than some real ones. Game designers, in turn, have a responsibility to ensure that their games reflect the truth. We can help our players learn and internalize that truth only by incorporating in our games not just our best understanding of the facts, as does the best physical science, but also a fundamentally honest assessment of human nature, like that found in the best literature.

In particular, high-engagement, role-playing games allow participants to interact with other human beings in situations involving competition, conflict, and cooperation—a great and necessary opportunity. But they are not without their limitations:

- It is difficult to play such games in other than real time. Although accelerated clock speeds and time jumps are possible, actual decision making cannot take place in anything other than real time, no matter how we try to convince ourselves otherwise, for the simple reason that humans can live and act only in real time.
- It is difficult to record what happens and why with enough fidelity and completeness to make it profitable and instructive to review and reflect upon events and decisions.
- It is difficult to explore variations in the decisions made and what the outcomes of those decisions might have been, especially to explore all the mistakes that we make.
- It is difficult to repeat an in-person, multiplayer game like a high-engagement game and impossible to "replicate" it in the sense of a Monte Carlo simulation experiment.

As a result, high-engagement role-playing games can represent one crucial element of the learning process, but they cannot be the only element. No one form of wargame can meet all our needs.

- We need high-engagement role-playing games to help decision makers experience interactions with other humans and also the emotional and psychological effects of those interactions.
- We need board-game-like tools (that is, manually managed open systems) to allow players to see (and even change) how elements of the game's models work to translate decisions into effects and events, so as to calibrate both those models and the insights the players derive from them and the play of the game.
- We need computer-embodied games to allow for ease of recording, ease of repeating, and ease of reflecting on experiences to assist in developing our "commonsense" approaches to dealing with uncertain and complex situations, as Dietrich Dörner argues so effectively in *The Logic of Failure.*

Ultimately, to make better games we need to tell better stories. We need to help our audiences learn better how to learn from those stories. Just as games, analysis, exercises, and real-world experience are all important tools that we need to integrate in a synergistic process, different types and modes of games play their own distinct roles (pun fully intended). Yet all games derive their power from the same source—their ability to open up their participants to self-transformation through the power of shared and constructed narrative.

But while recognizing the power and utility of games, we must simultaneously remain aware of their potential for mischief, a potential they share with all narrative forms. As our colleague and Naval War College professor Stephen Downes-Martin pointed out in his comments on an early draft of this article, it's hard to beat Hitler's *Mein Kampf* as an example of a narrative that exerted powerful influence on its audience. Its narrative played on the reader's emotions directly even while at times appearing to engage their intellects. Stephen has argued repeatedly—and, with us, directly—about the need for wargaming to be more than just an art form, to move into the realm of science. Artistic, narrative truth is one thing; scientific truth (true facts?) another. How do we best combine and balance them in our games?

This issue is one we hope to think about and explore farther in the future. For now, however, we propose the following concluding thoughts, optimistic and even triumphalist as they are.

## THE BOTTOM LINE

Wargames cannot escape their narrative nature, nor should we want them to. But the *use* of wargames, the discipline we call "wargaming," must adapt the tool to the purpose. Like a film or a book, no game is purely entertainment; by creating an experience, albeit a synthetic one, all these narrative forms inform and educate us to one extent or another. If we wargamers—we who create and employ these tools—are to fulfill our responsibility to our agencies, our companies, our nation, and yes, our species, we must first recognize why wargaming works and then apply its power in constructive and helpful ways to address the complex and uncertain issues that we face now and will face in the future.

As a final postscript, we offer an even more expansive view of how gaming can affect the real world and real people for the better—a prophetic vision from Jane McGonigal, the director of game research and development at the Institute for the Future:[33]

> Reality doesn't motivate us as effectively [as games do]. Reality isn't engineered to maximize our potential or to make us happy. . . .
>
> When we play, we also have a sense of urgent optimism. We believe wholeheartedly that we are up to any challenge, and we become remarkably resilient in the face of failure. Research shows that gamers spend on average 80% of their time failing in game worlds, but instead of giving up, they stick with the difficult challenge and use the feedback of the game to get better. With some effort, we can learn to apply this resilience to the real-world challenges we face. . . .
>
> We can harness the power of game design to tackle real-world problems. We can empower gamers to use their virtual-world strengths to accomplish real feats. Indeed, when game communities have been matched with challenging real-world problems, they have already proven themselves capable of producing tangible, potentially world-changing results. . . .
>
> Those who understand this power will be the people who invent our future. We can create rewarding, transformative games for ourselves and our families; for our schools, businesses and neighborhoods; for an entire industry or an entirely new movement.
>
> We can play any games we want. We can create any future we can imagine. Let the games begin.

### NOTES

1. See, for example, Peter P. Perla, *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Annapolis, Md.: Naval Institute Press, 1990).

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3. For a discussion of the serious game movement see, for example, "Serious Games Summit," *GDC: Game Developers Conference 2011,* www.gdconf.com/.
4. Dietrich Dörner, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations* (Cambridge, Mass.: Perseus Books, 1997).
5. Ibid., p. 193 [emphasis original].
6. For BOGSATs and other pitfalls of gaming, see Robert C. Rubel, "The Epistemology of War Gaming," *Naval War College Review* 59, no. 2 (Spring 2006), esp. p. 116.
7. For a discussion of gaming as a source of synthetic experience, see Perla, *Art of Wargaming,* p. 199. For the use of gaming to help prepare decision makers by developing decision strategies, see Dörner, *Logic of Failure.*
8. Richard Preston, *The Cobra Event* (New York: Ballantine Books, August 1998).
9. Tom Mangold and Jeff Goldberg, *Plague Wars: The Terrifying Reality of Biological Warfare* (New York: Macmillan, 2000).
10. Ibid.
11. Samuel Taylor Coleridge, *Biographia Literaria: or Biographical Sketches of My Literary Life* ([1817]; Project Gutenberg, July 2004), www.gutenberg.org/etext/6081.
12. Norman N. Holland, "Spider-Man? Sure! The Neuroscience of Suspending Disbelief," *Interdisciplinary Science Reviews* 33, no. 4 (2008), pp. 312–20.
13. Ibid.
14. Ibid.
15. Ibid.; Richard J. Gerrig, *Experiencing Narrative Worlds: On the Psychological Activities of Reading* (New Haven, Conn.: Yale Univ. Press, 1998).
16. Richard J. Gerrig, "Reexperiencing Fiction and Non-fiction," *Journal of Aesthetics and Art Criticism* 47, no. 3 (Summer 1989), pp. 277–80.
17. Holland, "Spider-Man? Sure!"
18. Robert T. Knight and Marcia Grabowecky, "Escape from Linear Time: Prefrontal Cortex and Conscious Experience," in *Cognitive Neurosciences,* ed. Michael S. Gazzangia, 4th ed. (Cambridge, Mass.: MIT Press, 2009), pp. 1357–71.
19. Shaun Nichols, "Imagining and Believing: The Promise of a Single Code," *Journal of Aesthetics and Art Criticism* 62, no. 2 (Spring 2004), pp. 129–39.
20. Hobby or commercial "live-action role-playing games" (LARPs) take these venue, kinesthetic, and social aspects of a game to an extreme—players physically act out and "live" their roles, often over multiple days in a real-world venue. LARPs are different from the professional, organizational games we are discussing here in that LARP players are far more immersed in the game world.
21. R. S. Perinbanayagam, "The Definition of the Situation: An Analysis of the Ethnomethodological and Dramaturgical View," *Sociological Quarterly* 15, no. 4 (Autumn 1974), pp. 521–41.
22. William L. Gardner and Bruce J. Avolio, "The Charismatic Relationship: A Dramaturgical Perspective," *Academy of Management Review* 23, no. 1 (1998), pp. 32–58.
23. Maurice Merleau-Ponty, *The Primacy of Perception* (Evanston, Ill.: Northwestern Univ. Press, 1964).
24. The idea of the Black Swan (capitalized), an unpredictable event with massive consequences, was popularized in Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007).
25. For a detailed discussion of what variables were used in *Dark Winter* see Tara O'Toole et al., "Confronting Biological Weapons: Shining Light on 'Dark Winter,'" *Clinical Infectious Diseases* 34 (2002), pp. 972–83. In that article the designers of the exercise admit they were faced with a serious choice: picking a too-low transmission rate might lead to false assumptions, but a too-high rate would cause excessive concern.

26. Milton Leitenbert, *Assessing the Biological Weapons and Bioterrorism Threat,* Strategic Studies Institute Monograph 639 (Carlisle Barracks, Pa.: U.S. Army War College, December 2005).
27. Noah Shactman, "DHS's New Chief Geek Is a Bioterror 'Disaster,' Critics Charge," *Wired,* 6 May 2009, www.wired.com/.
28. Leitenbert, *Assessing the Biological Weapons and Bioterrorism Threat.*
29. Abu Ghraib is the site of the worst of the abuses of Iraqi prisoners inflicted by U.S. service members in the first years following the fall of Saddam Hussein.
30. On media firestorms, see, for example, Brad Tiffee and Sean R. Fontenot, "Louisiana Catastrophic Hurricane Planning Workshop," *Louisiana Emergency Preparedness Association* 27, no. 2 (Spring 2005); and U.S. Government Accountability Office, *Hurricane Katrina: Better Plans and Exercises Needed to Guide the Military's Response to Catastrophic Natural Disasters,* GAO-06-643 (Washington, D.C.: May 2006), available at www.gao.gov/.
31. For a detailed discussion of this idea, see Perla, *Art of Wargaming,* pp. 285–90.
32. Dörner, *Logic of Failure.*
33. The extract is from Jane McGonigal, "Be a Gamer, Save the World," *Wall Street Journal Wireless Edition,* 22 January 2011, www.wirelessweek.com/.

# COMMENTARY

## THE LAST TIME WE WERE AT "GLOBAL ZERO"

*George H. Quester*

Skeptics of a total elimination of nuclear weapons often point to a "prisoner's dilemma" situation that might emerge, where everyone suspects everyone else of cheating by secretly retaining or manufacturing atomic bombs. Advocates of "global zero" sometimes then respond that this is all too theoretical and hypothetical, as we have no way of knowing whether such suspicions would be so all-powerful in a disarmed world.

Yet one can point out a real-life example of such a global-zero situation, in the last decades before Hiroshima, where the world's knowledge of the possibilities of a nuclear chain reaction was emerging and where the result was a "race" to build the bomb, with the United States "winning" this race in the Manhattan Project, Nazi Germany having done very little to produce such weapons.

An attempt will be made here to sort out the similarities and differences between the world from 1900 to 1945 and a future world where an attempt would be made to get us back to a total absence of nuclear weapons. If the similarities are too strong, the outlook for total, or even substantial, nuclear disarmament might be quite bleak. If the differences are more important, the pessimistic lessons here of preemption and distrust might not be so compelling.

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*Naval War College Review, Summer 2011, Vol. 64, No. 3*

### COMPARATIVE UNCERTAINTIES ON CAPABILITY

In the years after 1939, the last theoretical uncertainties about whether nuclear weapons were even possible had basically been eliminated, but there was great doubt on all sides as to whether the sheer task of

generating fissionable uranium-235, or plutonium, was industrially feasible. As the German, British, American, and Soviet (as well as Japanese) leaderships were briefed on the possibilities, the questions were always whether their respective countries could produce such bombs in a reasonable time at a manageable allocation of resources and whether opposing countries could do so.

In a future world, the analogous problems would instead be whether one's own country could successfully cheat on the system of international controls and inspections and whether other countries might be able to do so.

At various stages of the 1939–45 process, the industrial task of producing such fissionable materials seemed so huge that some British strategists actually suggested leaking rumors that Britain was entering this race, in order to trick Nazi Germany into wasting its resources on similar projects.[1] (Winston Churchill apparently rejected this option but worried that rumors of a Nazi bomb project might similarly be a trick to get Britain to waste *its* resources.)[2] A bit later, after Britain and the United States had concluded that the bomb was indeed worth pursuing, the Soviet secret police chief, Lavrenty Beria, apparently feared that espionage reports of British and American activities were also intended simply to mislead the Soviet Union.[3]

We live now unavoidably in a world where it is well established that nuclear weapons can be made and where fissionable materials are indeed plentiful as by-products of the generation of electrical power in nuclear reactors. The barrier now would be not the projected industrial difficulty of separating uranium or reprocessing plutonium but the difficulty of evading inspection.

***The Presence or Absence of Conventional War***

At a first look we might conclude that the Manhattan Project (and nuclear weapons) would not have emerged except for World War II. It is indeed a historical fact that the British MAUD project (otherwise code-named TUBE ALLOYS) and the American Manhattan Project (into which the British project was to be merged) did not emerge until Nazi Germany had invaded Poland. (Admittedly, something of a go-ahead on the Manhattan Project was given *before* 7 December 1941, when the United States entered the war.)

Will there be conventional wars in the future that exacerbate international hatreds and spur resumed pursuit of nuclear weapons? Some advocates of global nuclear disarmament indeed are assuming that ordinary conventional wars will now be rare, while others would advocate nuclear zero even if ordinary wars periodically occurred.

Yet there are some interesting paradoxes to be noted in the 1939–45 experience. One reason that the British were willing to merge their own nuclear weapons work into that of the Manhattan Project was that the sheer burden of

continuing the conventional war against Hitler, amid the risks of German bomber and missile attacks, made it unlikely that Britain could produce atomic bombs before World War II had ended.[4]

On the Nazi side, decisions again and again to avoid a major nuclear effort were based on estimates that no bomb could be produced in time for use in the current war, given the industrial burdens of all the other weapons projects under way and the intensity of Allied aerial attack.[5] Similar decisions, based on the existence of the ongoing war, played a role in Japan and the Soviet Union. It was only in the United States, endowed with major industrial capabilities and a basic immunity to enemy aerial attack, that the bomb was seen as relevant and feasible.

What if World War II had not begun? What if Hitler had been once again appeased when he attacked Poland or had been content for the time being with occupying Czechoslovakia? In a continuation of the 1938 theme of "peace in our time," would there have been too little enmity and hatred to stimulate the pursuit of nuclear weapons? Or would the very absence of bombing and a lowered drain on resources instead have energized German nuclear physicists, and their British and American opposite numbers, to seek this "wonder weapon"?

***The Role of Dictatorial Regimes***

The preemptive fear that drove the Manhattan Project was that Nazi Germany was seeking the bomb. Dictatorships are more capable of secrecy than are democracies (although the difference here is not absolute and should not be overstated) and are less sympathetic to other peoples, less committed to peace.

Will all the nuclear-capable powers of the future be democracies, or will some be relatively opaque and internationally unreliable dictatorships? The current examples of North Korea and Iran would seem to answer the question.

Nazi Germany came into being as a totalitarian dictatorship in part on a platform of anti-Semitism and intolerance of liberal academic standards. The ironic price was that a significant number of highly competent nuclear scientists were thus driven out of Germany because they were too liberal or too Jewish to be tolerated, and many of these people were to become key players in the Manhattan Project.[6]

It is thus interesting to speculate about a Germany where the Nazis did not come to power (the Nazi takeover in 1933 was indeed far from inevitable) and the Weimar Republic survived. The majority of physicists around the world who could have been involved in the design of nuclear weapons had studied or otherwise spent time at German universities in the 1920s, particularly at Göttingen. Some of the Hungarian physicists who, like Edward Teller, later worked in the Manhattan Project had been the victims of anti-Semitism in Hungary and came to Weimar Germany to escape this. Would not the loyalties of such people have

leaned toward Germany in such a world, as in fact they later leaned toward the United States?

If there had ever been a "race" to build atomic bombs between a democratic Weimar Republic and democratic Britain or the United States, Germany might have had a clear advantage. But we might all assume today that no such race would have been run among democracies. Would the advantage in a secret race for the atomic bomb then have passed to fascist Italy or Soviet Russia? Or would the enormous industrial investment required and the destructive enormity of the bombs that could be produced have held everyone back, in the absence of as frightening a totalitarian state as Nazi Germany and of the war that Hitler launched?

Or given the secrecy that Joseph Stalin's USSR and Benito Mussolini's Italy could impose, might not some of the same fears and preemptive drives have driven Britain, the United States, and a still democratic Germany to set up a MAUD or Manhattan Project?

***The Presence of Genocidal Motives***

Aside from being secretive and militarily aggressive, Hitler's Germany was particularly threatening because it proved to be spectacularly homicidal, killing millions of people not simply in the process of trying to win a war and conquer territory but because it *wanted* to kill them, simply because of their ethnicities. While the full extent of this was not clear until the German defeat in 1945, there were many reasons to guess before then that the Nazis were bent on genocide; rumors and reports emerged after 1933, especially after the Nazi conquest of Poland in 1939. It was thus widely assumed that Hitler might use the destructive power of nuclear weapons if he were ever to acquire them, perhaps to destroy London, perhaps Paris (after local German commanders ignored his orders that the French capital be destroyed by conventional means), perhaps Tel Aviv.

Are we truly free of all such genocidal motives in today's world? One might note some of the sermons and statements issued by Iranian clergymen declaring that nuclear weapons might be used to "kill" Israel, statements of motivation that have no parallel in the strategic pronouncements since 1945 of the other nuclear-weapons states. If we were thus asked to explain why it was "of course" necessary to beat Nazi Germany in a race to the atomic bomb, this willingness of the Nazis to kill people might loom up as an obvious factor, with or without parallels to the present.

Well short of Hitler's penchant for genocide, one also might have feared that Hitler would use the bomb to dictate an Allied surrender to his demands. There is also speculation that the Nazi bomb would have been used to head off surrender to Allied occupation and, thereafter, regime change. Stalin is reported to

have commented immediately after Hiroshima to the American ambassador, Averell Harriman, that if Hitler had gotten the bomb he would never have had to surrender.[7] In such a case, even had the advancing Soviet forces been successful in conventional combat and the British and American forces approaching from the west equally so, would a Nazi nuclear threat directed at Moscow and London have been sufficient to force the Allies to stop short of Germany?

Yet we might not have had to encounter so deliberately homicidal a regime as Nazi Germany to see bombs used to destroy cities—certainly if some state came uniquely to possess them. The United States used nuclear weapons on Hiroshima and Nagasaki not because it wished to kill Japanese city dwellers but because it wanted to end the war by forcing a surrender by the new threat to Japanese cities. German physicists who knew of the possibility of nuclear fission and (quite correctly) suspected the United States had a nuclear weapons project under way feared that such bombs would be used on German cities for just such a reason.[8] If there was no other reason for this assumption, one had the level of destruction that had been inflicted in the *conventional* air raids on Hamburg and Dresden.

A nuclear monopoly in Hitler's hands would thus have been particularly worrisome in the years after 1939. But such a monopoly in *anyone's* hands would also have been worrisome, and it would be so again in the future.

### *The Role of Opacity*

In the world of nuclear physics of the 1930s and 1940s, all the major players knew each other quite well. Werner Heisenberg, the likely head of any German nuclear weapons program, had been a sort of academic mentor to Hans Bethe, a major figure in the Manhattan Project, and this was typical of relationships around the globe. Heisenberg's mentor, in turn, had been Niels Bohr, who escaped from Denmark in 1943 to come to Britain and America to give advice on the Manhattan Project and to brief the Allies on what he knew of German nuclear efforts.

By comparison, the global population of physicists and nuclear engineers who would be relevant to nuclear weapons projects today is very much larger, so the links of personal trust or distrust are generally weaker.

As noted above, dictatorships can keep secrets, but democracies can do so too. In 1941, at the urging of Leo Szilard, American scientific journals had ceased publishing articles about nuclear fission, lest this alert and help the Germans. Some German physicists, noting the absence of new articles, came to the worrisome conclusion that the Americans might be embarked on bomb projects; this was in fact only *about to be* the case—people like Szilard were still alarmed that the United States had not yet decided to commit enough resources to the project.

Slightly later, Soviet nuclear physicists similarly became alarmed about the absence of new articles on nuclear fission in American journals, thus urging Stalin to initiate a bomb project.[9]

In the atmosphere of less-than-total openness here, even in democracies, the world saw a situation of fears and preemptive motives emerging *no matter what one did.* If American journals had continued publishing the relevant articles, fears would have been instilled. When the journals stopped publishing such articles, fears were instilled all the same.

One sees a similar inevitable opacity and fear in the much-discussed meeting between Werner Heisenberg and Niels Bohr in 1941 in which Heisenberg's mention of the generic possibility of bomb projects alarmed and angered Bohr.[10] In retrospect, it is difficult to see how Heisenberg could have reassured Bohr (and the Allies with whom Bohr was able to communicate) that Nazi Germany would not, could not, make the atomic bomb, because the mere raising of the possibility aroused suspicion. Was Heisenberg simply pumping Bohr on what the Americans and British might be doing? Was he trying to trick the outside world into missing that the Nazis were out to get the bomb? Or was he saber-rattling to intimidate Bohr and his friends?

One sees the same "damned if you do, damned if you don't" in postwar debates about whether Heisenberg and his colleagues deliberately slowed their work toward a bomb. The lack of German progress is typically dismissed as German incompetence, as the "Aryan" physicists sorely missed the expertise of the Jewish and other liberal physicists who had been driven out. Heisenberg and his remaining partners are accused of being intent on producing bombs but not knowing how to do it.

When it is pointed out that Heisenberg and other Germans indeed understood a fair amount about how atomic bombs could be made (as illustrated in a brilliant lecture that Heisenberg gave for his fellow internees at Farm Hall immediately after the news of Hiroshima outlining exactly how the Americans had done it, a lecture recorded by British listening devices), this is seized on as proof that the Germans were intent on making such bombs themselves.[11]

Looking ahead to any future world without nuclear weapons, all concerned will agree that verification, safeguards, and general transparency would be crucial to avoiding the worst-case interpretations of adversary motives illustrated by the above examples. To repeat, one quick comparison of the cases might give a very pessimistic impression: the opposing camps of nuclear physicists in 1940 knew each other so extremely well, in the still-small world of people who understood nuclear fission, whereas today there may be thousands of similarly aware and competent nuclear physicists around the world, hardly enjoying first-name, student-to-mentor relationships.

### *The Role of Assumptions about Military Impact*

For a host of very good reasons, we are inclined today to think of nuclear weapons not as military instruments relevant to battlefields but as weapons of mass destruction, relevant to intimidation and deterrence. The Cold War saw periods of enthusiasm for "tactical" and other more clearly military uses of nuclear weapons, but this may to some extent have been a device to make American nuclear escalation more credible, as extended nuclear deterrence required that ways be found to counter the supposed Soviet advantage in conventional forces. Military professionals perhaps are always inclined to look for more traditional "battlefield" uses for any new weapon. Also, Western morality disapproves of deliberate attacks on civilian targets, while it approves of attempts by navies to sink opposing navies, or air forces to destroy opposing air forces, etc.

Looking back to our first "race to produce nuclear weapons," some of the urgency, as noted, was the perception that Hitler would want to use atomic bombs (if he got them first) to destroy cities and massacre civilians, or at least to threaten such destruction and massacre. But other concerns pertained to whether the Germans might use such big bombs on battlefields, perhaps making them able to cripple a Normandy invasion or the like.

One role of General Leslie Groves as head of the Manhattan Project was to designate research-related targets in Germany to be attacked with conventional bombs, and strategic bombing in general played an important role in dampening any Nazi enthusiasm for a nuclear weapons program. But the question, very relevant to the future, then emerged of whether the rest of the Manhattan Project was therefore necessary. Were American atomic bombs needed to dig out German nuclear facilities, or would conventional bombing suffice?

President Roosevelt's response to the letter signed by Einstein warning of possible German nuclear efforts was to endorse the future Manhattan Project as a way "to keep the Germans from blowing us up."[12] But is the *military* linkage here so clear? Several analogies emerge, in today's discussions of how to respond to Iranian and North Korean nuclear efforts. If these facilities are to be attacked (tomorrow, or in some future world where other states have given up their nuclear weapons), will nuclear weapons be necessary and appropriate for the purpose? Many would argue that conventional attacks would be much better, to hold down collateral damage to those not guilty in the matter.

Even if a future Tehran or Pyongyang sneaks into possession of nuclear weapons and actually uses them, there is an argument even now for a "nuclear pacifism," whereby the response of the United States and the other responsible major powers would be to impose retaliatory punishment by substantial *conventional* attacks.

Our fears in the early 1940s with regard to Nazi Germany might thus actually suggest two models for the future. How terrible would it have been if the Germans got the atomic bomb while they were still doing well on the conventional battlefield, their armies deep into Russia and occupying France, or during the post-Stalingrad and post–Normandy invasion when the conventional defeat of the Nazis was fairly certain? Would they have been able to brandish nuclear weapons to keep the Americans west of the Rhine and the Russians east of the Oder? This points to how in a future "global zero" world we would feel about a conventionally weak, but otherwise obnoxious, adversary sneaking into the possession of nuclear weapons, perhaps to reinsure itself against the regime change and internationally imposed punishment that it deserved.

The clear question posed here is thus: Will either a strong or a weak conventional adversary, suspected of reaching for nuclear weapons, drive and force the responsible states quickly to renounce a "nuclear zero" international system and to race to make nuclear weapons for themselves once again?

## SOME VERY TENTATIVE CONCLUSIONS

It is surely too early to conclude that "prisoner's dilemma" mutual fears will doom any attempt to eliminate nuclear weapons. Yet any exhaustive review of the reasoning behind the British TUBE ALLOYS venture and the American Manhattan Project encounters assumptions about strategy that might seem perfect templates for the worst-case scenarios of a future nuclear-weapons-free world.

As suggested, the political background of the first "race" to acquire such weapons may have to be examined much more closely, to sort out the analogies with the future, to sort out whether "nuclear zero" has any chance of being achieved and adhered to.

## NOTES

This essay is an early product of a book-length study supported by a grant from the Smith Richardson Foundation, which is not responsible for any of the conclusions or opinions presented.

1. Thomas Powers, *Heisenberg's War* (New York: Knopf, 1993), p. 69.
2. Malcolm MacPherson, *Time Bomb* (New York: E. P. Dutton, 1986), pp. 110–13.
3. David Holloway, *Stalin and the Bomb* (New Haven, Conn.: Yale Univ. Press), p. 115.
4. On the British decision, see Margaret Gowing, *Britain and Atomic Energy* (New York: St. Martin's, 1964).
5. Richard Rhoes, *The Making of the Atomic Bomb* (New York: Simon & Schuster, 1986), pp. 404–405.
6. This pattern is outlined at length in J. S. Medawar and David Pyke, *Hitler's Gift* (New York: Arcade, 2001).
7. The comment is noted in Holloway, *Stalin and the Bomb,* p. 128.
8. See MacPherson, *Time Bomb,* p. 191.

9. See Holloway, *Stalin and the Bomb,* p. 78.
10. This interaction is much discussed in the literature. Quite sympathetic to Heisenberg is Powers, *Heisenberg's War,* pp. 113–18. Much less sympathetic is Paul Lawrence Rose, *Heisenberg and the Nazi Atomic Bomb Project* (Berkeley: Univ. of California Press, 1998), pp. 154–58.
11. See Powers, *Heisenberg's War,* p. 451, for Hans Bethe's evaluation of the transcript of Heisenberg's lecture.
12. The Roosevelt quote can be found in MacPherson, *Time Bomb,* p. 95.

# BOOK REVIEWS

## THINK AGAIN: SECURITY ISSUES FOR A NEW CENTURY

Reveron, Derek S., and Kathleen A. Mahoney-Norris. *Human Security in a Borderless World*. Boulder, Colo.: Westview, 2011. 255pp. $30

The authors, professors in professional military education in the U.S. Navy (Reveron) and the U.S. Air Force (Mahoney-Norris), bring more than sixty years of collective expertise as military officers and educators to their subject—"human security," which they define as "a people-centered approach focused on individual human beings and their rights and needs." The authors' purpose is to transcend the traditional national-security model rooted in the so-called realist school of international relations and offer a broader construct that examines a continuum of interrelated issue areas that affect individuals and groups in ways that cumulatively influence and shape regional and international security.

The authors argue that transnational issues in the twenty-first century have less to do with threats to territory than with threats to people and more to do with human development than with state-on-state competition and conflict. They aver that additional perspectives on security are necessary to grapple with contemporary challenges and threats that are neither constrained by nor dictated exclusively by states. They begin their examination by assessing global civic security, people's physical safety and integrity, noting that human development is often hampered by oppressive governments, while in other states it is impeded because weak governments cannot protect their people from predation by nonstate actors (criminal gangs, drug cartels, and smugglers) increasingly empowered by the tools of globalization. Importantly, throughout their book Reveron and Mahoney-Norris stake a position on globalization midway between Thomas Friedman's optimism and Moisés Naím's pessimism.

The authors identify and discuss economic security, people's capacity to provide food and shelter for themselves and their families, as a key component of human security. They note how inequitable development and severe poverty around the world imperil civic security by making weak states more susceptible to criminality, terrorism, and other forms of extremism. As a part of this discussion, Reveron and Mahoney-Norris delve into issues related to

sustainable development and the rising role of women in human security. They link civic and economic security to environmental security, pointing out how climate change will have implications for access to clean water and food, as well as for stable health conditions and ecosystem stability. The authors believe that climate change will weaken already feeble states and contribute to regional and global insecurity in ways not seen heretofore.

They offer a new focus on maritime security because new challenges and threats could manifest themselves on and below the world's oceans. Fisheries depletion and pollution could threaten a vital food source for a growing world population, while piracy and competing claims for sea routes and seabed hydrocarbons could contribute to forms of conflict not seen previously. Reveron and Mahoney-Norris also highlight two other areas often neglected by traditional security studies: health security and cyber security. They illustrate how in a more interconnected world infectious diseases carried inadvertently by modern air and sea travel could have deleterious effects on human security. Cyber security receives attention because both state and nonstate actors possess growing capabilities to disrupt the global population's increasing interconnectedness and mounting dependence on the virtual world.

This highly accessible book offers a novel approach to security studies, including insightful inserts ("Think Again") to stimulate readers' thinking about security issues for a new century. *Human Security in a Borderless World* should prove invaluable to a wide audience ranging from civilian and military students to policy makers and those who advise them.

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Murphy, Martin N. *Somalia, the New Barbary? Piracy and Islam in the Horn of Africa.* New York: Columbia Univ. Press, 2011. 176pp. $26.50

Within the sea services, allusion to the Barbary pirates and the "shores of Tripoli" continues to resonate. Readers of Martin Murphy's detailed and thoughtful book *Somalia* may come away wishing that a solution to the situation our mariners and fleet forces now face in those inhospitable waters were as straightforward as storming the beaches.

Murphy's previous works include *Small Boats, Weak States, Dirty Money: Piracy and Maritime Terrorism in the Modern World* (2009). He introduces the current volume with this caution: "The purpose of this book is to examine whether or not state failure is a useful and accurate explanation of Somali piracy. . . . It will ask if there are links between Somali pirates and international or regional terrorist groups. Even if these links are tenuous, it will ask why and how the terrorist groups that operate within Somalia might exploit the maritime dimension in the future. Finally, it will review whether or not naval action, in the absence of political engagement with entities within Somalia, will provide solutions to either problem, and if, perversely, achieving the political stability that may reduce or eliminate piracy might provide violent Islamist groups with the secure sanctuary within Somalia they are seeking." In

posing these questions Murphy takes the story forward from that told in *Small Boats,* which looked at maritime crime worldwide. Although this work, like his earlier book, finds no direct link between terrorism and crime, despite circumstances conducive to both, the question remains how long the international maritime community can tolerate the effects of such an expensive absence of the rule of law.

The current volume treats Somali piracy as it should be treated, sui generis. Piracy as experienced today off Somalia, and emanating from that nonstate, cannot be compared to contemporary experiences in the Gulf of Guinea or those in the Strait of Malacca or among the islands of the Indonesian archipelago. As dangerous as those waters are, the crimes they record are mostly of the "smash and grab" variety, perpetrated against ships in port, maneuvering slowly in restricted waters, or at anchor. Virtually all these crimes have occurred in territorial waters and thus within local or national law-enforcement jurisdictions, rather than on the high seas, a point that is critical to the legally actionable definition of the internationally recognized crime of piracy.

Many archipelagic and littoral states lack the will or effective capacity to exercise their maritime sovereignty and to combat crime uniformly throughout their maritime territories. However, only Somalia among today's community of nations so lacks a sense of unitary statehood that pirate bands may function as if they governed a ministate within its borders. Yet these pirate "strongholds" are virtual only, without the centers of gravity that even a ministate would possess. In that sense, they are not in reality the New Barbary but something more ephemeral and even more difficult to call to account.

How difficult is amply demonstrated in Murphy's detailed history of modern Somalia and the forces that continue to conspire to keep it ungoverned and, so far, ungovernable. *Somalia, the New Barbary?* not only takes us through the history of Somalia's failure to gel into stable statehood but illustrates at each turn how these continuing failures contributed to the ongoing pirate dramas playing out in the waters off the Horn of Africa.

There are few heroes in this story, and the international community, insisting on support for the minimally effective Transitional Federal Government as its sole interlocutor in combating piracy and explaining away the lack of progress despite huge sums spent on counterpiracy patrols and escort duties, bears a large part of the burden. As Murphy demonstrates, a large part of this inability on the part of the international community lies in the legitimate fear of creating an even more intractable problem should the extremists, currently characterized by the Islamist al-Shabaab, form a governmental shield behind which piracy could both thrive and marry itself to extremism. However, as Murphy pointed out in *Small Boats* and now refines in *Somalia,* these fears have no basis in evidence. In fact, there is ample evidence that the money-driven pirates continue to hold political influences of all stripes at arm's length, fearing restriction on their operations and heavy taxation of their ill-gotten gains.

Where the above has caused many observers to throw up their hands, resignedly calling down a plague on all their houses, Murphy carefully outlines how

Puntland, which is largely self-governing and (by Somali standards) governed, but which also hosts the vast majority of pirate operations, could be a key either to combating piracy or to being held accountable for not doing so. However, either way, the international community needs to extend tacit recognition to Puntland's *capabilities*, if not its sovereignty, in order to harness any sense of responsibility to that international community.

The bigger challenge to the United States and to its navy may come from the appearance of a power vacuum that continued Somali pirate success offers. Many nations have joined the counterpiracy coalition off the Horn of Africa, but as Murphy points out, not all forces are equally effective, except perhaps in demonstrating their nations' right to be there. As long ago as 1809 the Royal Navy, operating with armed ships of the Honourable East India Company, engaged pirates who were operating in the Strait of Hormuz with the benign neglect of local rulers along the littoral. After protracted combat, culminating in the battle of Ras al-Khaimah, that left the waters relatively safe, the Royal Navy remained as the international guarantor of the safety of trade, and Britain enjoyed a century of military, political, and economic preeminence. Britain would not be the last to seek to do so.

*Somalia, the New Barbary?* thus takes the reader beyond the breakers, which may be all of Somalia that most analysts of the current maritime scene have examined, and returns us to essential questions on the water. It is an experience every reader with an interest in matters that impel naval operations ought to embrace.

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*(The views expressed here are purely the author's and do not necessarily reflect the position of the U.S. Navy or of the Office of Naval Intelligence.)*

Moore, John Norton, and Robert F. Turner, eds. *Legal Issues in the Struggle against Terror*. Durham, N.C.: Carolina Academic, 2010. 565pp. $70

For the better part of the last ten years, the word "terrorism," in some shape or form, has become an integral part of the world's vocabulary. Whether in regard to military operations, air or sea transportation, law enforcement, cyber communications, or even the environment, responses to perceived or actual threats almost always include some form of counterterrorist activity. With each response, various legal rights, and regimes that society and individuals rely upon and often take for granted, are time and again directly impacted. Whether such impacts are experienced as good or bad depends in great part on one's ability to understand clearly the issues, which is where *Legal Issues in the Struggle against Terror* comes in.

This book of essays is essential reading for anyone looking to understand the many significant and complex issues regarding responses to terrorism since 9/11. The essays, written by legal experts and scholars, put into context, using words that are easy to read and understand, some of the most hotly contested international and domestic legal issues. The editors state in the preface that this work is an important collection of essays that cover topics considered integral to the "struggle against al Qaeda and its terrorist allies."

However, the topics the editors chose to cover in this book also include detailed insight and analysis that transcends the struggle with al-Qa'ida and undoubtedly will be debated and revisited in many venues for years to come.

While it is impractical to review in detail each individual author and chapter, a brief synopsis of the discussions presented is essential for assessing this book's value within the scope of current events. Detailed yet readable analyses of the issues and challenges involving detainees and military commissions, U.S. constitutional issues, national security concerns, intelligence efforts, the law of war, and civil-military relations provide a broad overview of the legal concerns and challenges the government faces when confronting terrorists. A chapter discussing civil liberties provides an integral counterbalance and reminds readers of the human impacts that efforts to counter terrorism often create.

Collectively, these essays represent a well reasoned and researched look into the role of executive power and the challenges that confronting terrorism on a global scale presents to those tasked with applying (or even developing) domestic and international law. To their credit, the editors clearly note that many of the issues addressed by the authors are "so new or so unsettled that no one can draw bright legal lines with great confidence." If the book does not offer any bright legal lines, it does help focus readers on where those bright lines might better fit within the various issues discussed.

This book's worth is reflected in the quality of authors whom Moore and Turner selected. Arguably, their diverse and notable backgrounds make this book a uniquely authoritative compilation. From a law-school dean to several law professors, as well as current and former senior CIA, military, and homeland-security legal professionals, the authors are recognized and tested experts within their areas of expertise. Undoubtedly, John Norton Moore and Robert F. Turner's own extensive backgrounds and reputations in international law have enabled them to bring together individuals who clearly were up to the challenge. The reader is much better off for the results.

Overall, *Legal Issues in the Struggle against Terror* is an important work that should be considered an integral resource for anyone interested in the legal, ethical, and moral issues that efforts to counter terrorism raise in the twenty-first century.

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Coram, Robert. *Brute: The Life of Victor Krulak, U.S. Marine*. New York: Little, Brown, 2010. 374pp. $27.99

Victor "Brute" Krulak is a legend within the U.S. Marine Corps. That may be a cliché, but it is true. This reviewer personally witnessed this phenomenon at the Naval War College, in Newport, Rhode Island, nearly four decades after Krulak left the service. While delivering a lecture at the College, I flashed a picture of Krulak on the screen. Instantly, audience members began to call out Krulak's nickname—"Brute! Brute!" The fact that Krulak's son became Commandant of the Corps only enhanced his reputation. The funny thing about Krulak's being so admired is that he never held a major combat command

as a general officer. He was brave, and he won hero medals in World War II, including the Navy Cross, but as a general during the Vietnam War he was in Hawaii instead of in country. Flag and general officers usually need to be combat leaders during a war to reach iconic status.

As a result, this biography of Krulak by Robert Coram is an all the more worthy contribution to the historical literature on the American military. Coram was trained as a journalist and has written two biographies of Air Force colonels, John Boyd and Bud Day. This background proved important, because Krulak had a powerful military intellect and could think well on how to employ military power in all three mediums, air, land, and sea.

Coram makes a strength out of a weakness when he starts the biography off in what seems a vague fashion. Krulak was a brilliant self-promoter who often distorted the historical record to bolster his reputation. This tendency included lying about his early years growing up in Wyoming. Born and raised a Jew, Krulak decided sometime after his arrival at the U.S. Naval Academy that he was an Episcopalian. He also hid the fact that he had married as a teenager. Although his deception regarding his ethnic and religious identity could be understood as a consequence of the bigotry of the time, it continued for the rest of his life. One of his biggest claims was for a wartime association with Lieutenant (junior grade) John F. Kennedy —there was none. Krulak's assignment to the Kennedy White House had nothing to do with old ties of wartime comradeship.

As Coram notes, what is important about Krulak is his military career, not so much his personal character. With that point made, Coram—in a testament to his skills as a reporter—does a good job of letting the man's personality come through. The biography grows in strength as Krulak moves through his career. In the days before World War II he made major, truly important contributions to the development of amphibious warfare. After the war he helped develop doctrine for the use of the helicopter. In the 1960s he turned his intellect toward counterinsurgency. The section on counterinsurgency is the best part of the book, though specialists will want to see more than is there. Krulak had good ideas that are still extremely relevant. In all of this, Krulak was a constant defender of the institutional interests of the U.S. Marine Corps, including in the acrimonious debates on military unification in the late 1940s.

In short, after reading this book it is easy to see why Krulak is such an icon. Marines and others will enjoy the read.

NICHOLAS EVAN SARANTAKES
*Naval War College*

Peattie, Mark, Edward Drea, and Hans van de Ven, eds. *The Battle for China: Essays on the Military History of the Sino-Japanese War of 1937–1945*. Stanford, Calif.: Stanford Univ. Press, 2010. 614 pp. $65

The title of this book appropriately suggests a degree of ambiguity regarding the actors fighting over the territorial integrity and cultural identity of China. The interplay of imperial Japan, Nationalist and Communist Chinese, Great Britain, Germany, Russia, France, and the United States from 1937 through 1945 creates a terrain challenging to

navigate with historical accuracy and objective truth. The conflicting viewpoints on these contentious events have proved difficult, and perhaps impossible, material from which to develop a definitive narrative. Consequently, the editors have chosen to avoid illusions of defining the "facts" of the matter, instead offering a number of exploratory essays from opposing viewpoints. In order to offer this multisource assessment, the editors coordinated the efforts of scholars from China, Taiwan, Japan, and the United States.

Editors Mark Peattie (a research fellow at the Hoover Institution), Edward Drea (former chief of the Research and Analysis Division of the U.S. Army Center of Military History), and Hans van de Ven (a professor of modern Chinese history at Cambridge University) stand apart as leading authorities on the Pacific War. The other seventeen contributors range from unknown doctoral candidates to heavyweight historians like Ronald Spector. Despite the pitfalls of bringing together authors of multiple disciplinary backgrounds, varying languages, and competing cultures and ideologies, the editors have maintained a surprisingly well organized text, firmly grounded in analysis of events from the perspective of military affairs.

The book is organized in six parts: the overview; opposing armies' organization, training, and equipment; initial hostilities (1937–38); a "stalemate in strategies" (1938–42); the Burma and Ichigo campaigns (1943–45); and conclusions. Each section begins with valuable information provided by the editors, furnishing continuity between thematic essays. The essays themselves are insightful, if not groundbreaking, offering milestones for future study and debate. One innovative and striking theme is the attention to and appreciation for the challenges facing Chiang Kai-shek and the Nationalist Party, the Kuomintang (KMT). While not excusing any failures, the authors make it easy to understand the KMT's weak position in an agrarian society with undeveloped state organization in the face of a growing communist insurgency, tepid allied support, and a vicious campaign of destruction by an industrialized opponent. The deprivations endured and the sacrifices made by the Chinese through seven long years of the most brutal warfare does much to explain the KMT's precarious situation at the war's end. At the end of the book, Ronald Spector provides excellent context to these essays on the Sino-Japanese War, placing the scholarship within the framework of the Pacific War, World War II, and the history of warfare.

For military officers, I think, this book provides a number of important insights. For one, it imparts valuable lessons regarding the success of and shortcomings in the Imperial Japanese Army. At a tactical and operational level, the Sino-Japanese War validates the Japanese emphasis on offensive tactics and aggressive spirit to overcome numerical superiority of opponents—a technique proven successful in this case against the Chinese rather than the Russians, for whom the Japanese had prepared.

My only criticism of *The Battle for China* derives from the inadequacy of the maps. Those not intimate with Chinese, Japanese, and Burmese geography will find places described difficult to locate. For instance, the prominent province of Chahar in Inner Mongolia finds its name nowhere on the fourteen maps, including that given for the battle

of Pingxingguan Pass, which took place in Chahar. The Burmese map shows fewer than half the important locations discussed and no indications of the Burma Road, for which the forces were fighting. The Japanese province of Kyūshū was certainly an important place for recruiting, but one will have to look elsewhere to find its location. The political instability of the period exacerbates the situation in terms of geography. Many locations have Japanese, Chinese, and European names. For instance, the Japanese refer to Tianjin, near the city of Peking (modern-day Beijing), as Tientsin. This situation is compounded by the fact that provincial boundaries and place-names of what we now call China, especially in the north, changed frequently in the mid-twentieth century. Although the political and geographic landscapes of the Sino-Japanese War admittedly pose a challenge, the maps could have better illustrated the events described.

As I am not certain that Chinese or Japanese audiences (those most interested in this topic) will gravitate to this English work, *The Battle for China* must be presumed to target a small niche market of Sino-Japanese War military history enthusiasts in North America and Europe. To offset what may be limited interest in its subject, I feel compelled to praise in the strongest terms the efforts of Peattie, Drea, and Van de Ven in organizing, editing, translating, and publishing this important book. Without these distinguished professionals, Western students of the Pacific War would not have access to this important Chinese and Japanese research, mediated by celebrated Western scholars. *The Battle for China* is a rare treasure that will likely renew interest in an underdeveloped field of Western scholarship. I highly recommend it to those interested in the Pacific War or greater insight into modern Chinese history.

MAJ. ROBERT BURRELL, U.S. MARINE CORPS
*U.S. Special Operations Command*

Mort, Terry. *The Hemingway Patrols: Ernest Hemingway and His Hunt for U-boats.* New York: Scribner's, 2009. 272pp. $26

The Battle of the Atlantic has been thoroughly researched and exhaustively studied, especially by students attending the Naval War College. However, rarely has the epic campaign to defeat the German U-boat menace been viewed through the lens of the life and personality of one of America's greatest literary figures. In *The Hemingway Patrols,* Terry Mort offers a well researched account of this great campaign, one that reads almost like an actual Hemingway novel.

For students of military history, Mort's account of the titanic struggle between the Allied navies and German U-boats in the early months of 1942 will be somewhat familiar. It is the juxtaposition with Hemingway's decision to participate in the campaign that provides the strength of this narrative. Mort depicts Hemingway in 1942 as at the zenith of both his life and his professional career. Likewise, the German U-boat campaign would reach its zenith during this year: American shipping suffered grievous losses at the hands of only a dozen or so U-boats in the early months. Why would Hemingway, living in luxury in Cuba at the time, risk everything, with his drinking buddies, to hunt U-boats in his wooden fishing trawl

*Pilar*? Having studied at Princeton with Hemingway biographer Carlos Baker, Mort provides one of the most convincing explanations yet offered for Hemingway's decision to place himself in harm's way.

It would be easy simply to ascribe Hemingway's decision to that of a writer living out the life that he had illustrated in his art. Mort takes a more scholarly approach, however. One of the most interesting elements of this book is its description of the three stages through which each of Hemingway's characters pass in his novels—the stage of innocence, then suffering, and finally an existential stage, in which the hero creates meaning out of nothingness. It is certainly possible to see Hemingway himself following this trajectory. In the imaginative mind of a writer, the U-boat appeared as a multifaceted menace, not only a threat to merchant vessels but a stealthy craft that could deliver spies to the many coves and inlets of Caribbean islands like Cuba. Hunting down and attacking these modern weapons of war would require a dedicated band of ardent antifascists, the likes of whom Hemingway had consorted with in Spain in the late thirties, and whom he would lead into action again, as his small fishing vessel sought valiantly for the elusive U-boats throughout the Caribbean and the Gulf of Mexico. Many elements of Hemingway's complex personality combined to compel him to sail *Pilar* into action, and Mort gives each of these factors due treatment.

A former naval officer himself, Mort is familiar with life at sea. The many accounts of Hemingway leading his crew on these dangerous missions benefit from Mort's having participated in patrols in some of the same waters. In summing up this work, one phrase stands above the rest as a testament to the sweeping panorama of Mort's ambitious attempt to tie together a great naval campaign and the life of an American literary giant: "It was action and artistry combined. It was also fun, most of the time, especially when there was enough gin." Mort has provided us with a fascinating book, and students of both military and literary history will definitely want to put *The Hemingway Patrols* on their reading list.

JEFF SHAW
*Naval War College*

Stoker, Donald. *The Grand Design: Strategy and the U.S. Civil War.* New York: Oxford Univ. Press, 2010. 498pp. $27.95

It is difficult to imagine historical ground that has been more thoroughly mined than that of the American Civil War. Biographies, battle studies, sweeping histories, and all manner of specialized analyses dot the literary landscape. However, rather than turning away from a potentially saturated market, our collective interest in this sanguinary conflict has kept publishers and authors delivering a steady stream of material year after year after year.

It is nonetheless a brave author who claims to offer something truly original to our understanding of the war. Although some scholars may quibble over whether or not Stoker has succeeded in this effort, his *Grand Design,* a one-volume history that examines the role of strategy in the Civil War, is something of a rara avis. More to the point,

it is both a useful and thought-provoking addition to any library.

Surprisingly, Stoker is at his weakest when discussing just what he means by strategy. The term is admittedly somewhat slippery, and competing definitions abound. In the end, Stoker settles, by his own admission, for examining the linkage of political policy objectives and subsequent military operations.

As a result, the two most important personages in the book are Abraham Lincoln and Jefferson Davis. As political leaders of their respective sides, it was they who were responsible for setting and approving political policy and objectives. Lincoln emerges as a political leader who, having once determined the political objectives of the United States, was forced time and again to intervene in the running of the war because his generals failed to gain those objectives through military operations. In doing so, Lincoln gradually gained a distinct appreciation for the military art and sharpened his ability to see clearly which courses of action would likely produce successful results. Davis, in contrast, saw himself as the Confederacy's general in chief and would persist in that notion to the detriment of the Confederate war effort until 1865.

Stoker naturally examines the military men on the other side of the political-military equation. Perhaps no one should have expected strategically gifted senior officers to be found in the ranks of the U.S. officer corps in 1860, and Stoker confirms that such men were then lacking, with the possible exception of the aged Winfield Scott. The U.S. Army was small, its garrisons were small, and with the exception of the brief war with Mexico, its units had always been small. The only big things about the Army were its theater of operations and the egos of some of its more famous personalities. Yet individuals with a broader expanse of vision did emerge. The best of these wore Union blue, and Stoker makes a convincing argument that the best of the best was Ulysses S. Grant, a man notable in his ability to complement the president's policies and objectives with effective military operations. Stoker argues that Grant's success was not just a question of superior resources. Grant saw beyond his theater of operations. He understood the tools available to him, and he worked in harness with his political leader. William T. Sherman is also given credit for being a general in strategic alignment with national policy and objectives. In contrast, however, Stoker reasonably judges George B. McClellan as a general with strategic insight and imagination but woefully incompetent when it came to battlefield leadership, without which strategic objectives cannot be realized.

Stoker is far from being an unabashed fan of the Union's strategists; his biggest censure on its generals' performance is that they were slow. He convincingly claims that a Union victory was possible much earlier than the spring of 1865; however, he does not regard that victory as inevitable. In contrast, he faults Confederate counterparts with never getting it right at all. His criticisms of Jefferson Davis's fixation on forward defense and the waste of trying to preserve and protect the Confederacy west of the Mississippi are well argued indeed. Stoker gives credit to Robert E. Lee for his capability to be as good as Grant but notes that he was nearly always confined to theater operations. General P. G. T. Beauregard, a

self-proclaimed Southern strategist, is simply and reasonably dismissed as a fantasist.

Given the number of bad books that have been written about the Civil War, it is a pleasure to find a good one. Stoker is a solid, competent author who makes his points in clear convincing prose. Written from a refreshing viewpoint, *The Grand Design* is a book worth reading.

RICHARD NORTON
*Naval War College*

McMeekin, Sean. *The Berlin–Baghdad Express: The Ottoman Empire and Germany's Bid for World Power, 1898–1918*. Cambridge, Mass.: Harvard Univ. Press, 2010. 496pp. $29.95

If ever there was a story of epic unintended consequences and "might have beens," Sean McMeekin's *The Berlin–Baghdad Express* is it. Approaching the First World War in the Middle East from the German and Ottoman perspectives, McMeekin expands our Anglo-centric understanding of the conflict. In doing so, he unveils a breathtaking catalogue of misunderstandings, miscalculations, simple mistakes, and missed opportunities that would be comic if not so horribly tragic.

While the title conjures images of the fabled Orient Express, the book is a first-rate history of the diplomatic jockeying of the German and Ottoman Empires to gain advantage over their respective archrivals, Britain and Russia. The railway would be a tool to enable Germany's *Drang nach Osten* (drive to the East) while strengthening the Turks (bitter enemies of Germany's Russian rivals) by linking the farthest reaches of the Ottoman Empire with the seat of power in Istanbul. The completion of the railway, first to Baghdad and then extended on to Basra, would have profound political, economic, and strategic importance.

To achieve this end Germany designed a strategy to undermine the cohesion of the British Empire through Islamic holy war. That strategy was an outgrowth of Kaiser Wilhelm II's reckless and amateurish meddling in Oriental affairs. The kaiser believed that his affinity for Sultan Abdulhamid II, Caliph of the Faithful, and for all things Islamic would enable him to engineer a jihad against the hated British, targeting the empire's large Muslim populations in India, Egypt, and beyond. The kaiser, in league with the sultan and later the Young Turks, embarked on ambitious propaganda and military campaigns designed to rally Muslims to the sultan's call for jihad, despite the facts that most educated Muslims had long given up the idea of the caliphate; that there was no distinction in Islamic jurisprudence or practice between a bad infidel (British, French) and good one (German, Austrian, American, or maybe Italian); that Sunni and Shia Muslims had vastly different views of jihad; and that the British had for years controlled access to Mecca for the hajj. McMeekin also points out the oddness of German support for jihad juxtaposed with the German-based Zionist movement, which actually anticipated Britain's Balfour Declaration to establish a Jewish homeland in Palestine.

The cast of characters includes soldiers, statesmen, adventurers, charlatans, humanitarians, and thugs from across Europe, the Caucasus, Africa, and the

Middle East. Many are familiar, such as Kaiser Wilhelm, Abdulhamid II, and T. E. Lawrence. Still more are rather obscure. Central among this group are "Baron" Max von Oppenheim, a Jewish scion of the famous banking family, and Curt Prufer, a scholar assigned to the German embassy in Cairo. Both were Orientalists, both were devotees of Kaiser Wilhelm, and both shared the kaiser's vision of jihad. Together they worked to foment holy war from Libya in the west through Egypt, Abyssinia, Sudan, Arabia, Iran, Afghanistan, and India. After the war they emerged in the forefront of Nazi anti-Semitism and the atrocities that it produced.

A common theme found throughout the narrative is that of miscalculation born of ignorance or misunderstanding of basic historical, cultural, political, and religious truths. A prime example is Germany's tendency to see the Muslim world as either for the Germans or against them, while missing the vast range of options in between, a problem that persists in varying degrees today. Another is the complexity of the region that breeds such miscalculations. McMeekin's treatment of the struggle for control of Baku in August 1918 provides a brief but illuminating example of just how complex that corner of the world can be. With British, German, Russian, Turkish, Armenian, Azeri, and other factions vying for control of the city (and its oil), fighting was not only savage but included intramural attacks upon allies. As we look at Afghanistan, Pakistan, the Caucasus, and other tribal regions today, we can see that the same elements of complexity and confusion that bedeviled earlier Western strategists is ours to deal with again, and again.

Sean McMeekin is assistant professor of international relations at Bilkent University, in Ankara, Turkey. His work is based on German, Turkish, Austrian, Russian, and American archives, as well as secondary sources. It is carefully researched, well documented, and presented with a lively style that combines analysis, insight, and a mix of irony and wry humor that makes the book as readable as it is informative.

COL. THOMAS E. SEAL, U.S. MARINE CORPS, RETIRED
*Stafford, Virginia*

# OF SPECIAL INTEREST

## THE ESSENTIAL CIVIL WAR CURRICULUM

*The Essential Civil War Curriculum* website, a Sesquicentennial Project of the Virginia Center for Civil War Studies and the History Department of Virginia Polytechnic Institute and State University (Virginia Tech), was launched on 4 March 2011 at www.essentialcivilwarcurriculum.com/.

What do those interested in the Civil War need to know to increase their knowledge and understanding of this important event in American history? The *Essential Civil War Curriculum,* overseen by professional Civil War historians, guides the reader to the important topics and sources that every student of the war, amateur or professional, needs to understand.

*The Essential Curriculum* is owned by the Virginia Center for Civil War Studies, "a formal entity for studying and sharing knowledge" (as described by its mission statement) about the Civil War with "both academic and public audiences." The site is sponsored by Professor William C. Davis and Dr. James I. Robertson, Jr.; Mr. Laurie Woodruff conceived, financed, and now manages and edits it. The site operates under a wiki model; a Board of Historians composed of the country's most eminent Civil War scholars invites contributions and approves all postings and content. Eventually the website will offer information on over four hundred topics.

Contact Laurie Woodruff, executive director and editor, *Essential Civil War Curriculum,* essentialcivilwarcurriculum@hotmail.com.

## WINNER OF FIRST HATTENDORF PRIZE

Professor N. A. M. Rodger has been named as the inaugural recipient of the Naval War College's Hattendorf Prize. Rodger, a leading British naval historian and senior research fellow at Oxford University, is a fellow of both All Souls College and the British Academy.

The prize is meant to express appreciation for distinguished work in the field of maritime history, specifically on the roles, contributions, limitations, and uses of the sea services. It was established in recognition of the scholarship and service of the College's Ernest J. King Professor of Maritime History, Dr. John Hattendorf. It is made possible with the support of the Naval War College Foundation, through the generosity of Pamela Ribbey, in honor of her late

grandfather, Capt. Charles H. Maddox (1886–1964), a pre–World War II Naval War College graduate and faculty member.

The award, which is to be given generally at two-year intervals, includes a bronze medal, a citation, a monetary gift of $10,000, and the opportunity to deliver a lecture (to be published in this journal) at the Naval War College.

# REFLECTIONS ON READING

*Professor John E. Jackson is the Naval War College's manager for the CNO's Navy Professional Reading Program.*

*Complex social behavior such as leadership can be taught by calling attention to more experienced leaders in action.*

HOWARD PRINCE

When you enter the word "leadership" into the Google search engine, you get 285 million hits, which is one indication of the volume of material available on the complex issue of how individuals motivate and direct the behavior of others. No single theory of leadership development is universally accepted. Opinions range from that of writers who claim that leadership is an inherent trait that exists in some people since birth (and cannot be taught) to the view of Professor Howard Prince, whose quote above expresses his belief that studying the actions of experienced leaders can improve the skills of those desiring to be more successful in leading others. The Navy Professional Reading Program (NPRP) subscribes to the notion that exposure to the experiences of notable leaders can be instructive, and the ten books in the "Leadership" category provide a good starting point for study. Here are some examples.

*Lincoln on Leadership: Executive Strategies for Tough Times,* by Donald T. Phillips, is a quick read by a best-selling author who is a great storyteller. He uses the life of one of the nation's most effective presidents to illustrate how good leaders succeed in the most demanding of times and situations. Chapters on getting to know your people, setting clear goals, leading by example, and skillfully communicating are as relevant in the twenty-first century as they would have been to Lincoln in the mid-1800s. Notre Dame football coaching legend Lou Holtz has written, "For anyone whose job is motivating and inspiring others, this book is indispensable."

*Shackleton's Way: Leadership Lessons from the Great Antarctic Explorer,* by Margot Morrell and Stephanie Capparell, tells the story of British explorer Sir Ernest Shackleton, who used unparalleled leadership skills to save the lives of

twenty-seven men stranded with him in the Antarctic for almost two years. After his sailing ship *Endurance* was frozen into an ice pack and ultimately crushed and sunk, he kept his crew alive in almost unbelievable conditions. While the book reads at times like an adventure novel, the two veteran business writers skillfully translate Shackleton's leadership genius into lessons specifically applicable to today's military professionals. Some of the chapter titles—like "Creating a Spirit of Camaraderie," "Getting the Best from Each Individual," and "Leading Effectively in a Crisis"—provide a hint of the breadth of topics contained in this widely praised book.

*Leadership: The Warrior's Art,* edited by Christopher Kolenda, is a remarkable collection of nineteen essays written by scholars, military leaders, and business executives. The book is divided into three sections: "Ancient and Modern Concepts of Leadership," "Historical Case Studies," and "Contemporary Experiences and Reflections on Leadership." The anthology covers leadership from the classical to the modern, from Alexander the Great to the Gulf wars. While many of the essays have an "Army-centric" viewpoint, careful reading discloses the applicability of many concepts to Navy scenarios and to the business world. Noted author Wess Roberts calls this book "a robust collection of thought-provoking essays written by an extraordinary group of accomplished thinkers and leaders." The chapter "Unleashing Human Potential" is particularly enlightening.

*The Good Shepherd,* by C. S. Forester, is the story, originally published in 1955, of a U.S. Navy officer commanding a small group of destroyers on escort duty in the North Atlantic during the early days of the Second World War. Forester, best known for his Horatio Hornblower novels, does a marvelous job in describing the human side of the commander, forced to make life-and-death decisions on the basis of limited and flawed data. The book's protagonist is not superhuman; he is in many ways a flawed individual, with many self-doubts. As such, he is not unlike many of the men and women who serve in uniform today. Though set more than a half-century ago, the challenges faced by the men of USS *Keeling* are similar to those of mariners of today. The angry sea, bone-chilling cold, and the loneliness of command have changed little across the decades. While readers cannot actually serve under Commander Krause, they can observe and learn from the successes and failures of this poetic hero.

The other six books in the leadership category also allow readers to observe vicariously leaders in action, and they illuminate traits and characteristics that may help readers shape their own leadership styles. Reading about great leaders is obviously less effective than seeing them in action, but it does at least provide a window into the minds of leaders like Winston Churchill and Abraham Lincoln.

The ten leadership books in the primary NPRP library and the two dozen titles on the Supplemental Reading list on the program website at www.navyreading.navy.mil are great places to continue your leadership-development process. Remember, the motto of the Navy Professional Reading Program is: "Making Leaders . . . One Book at a Time."

JOHN E. JACKSON